Supplementary:

Picture 1: Hydroponic installation in the ICTA-UAB rooftop greenhouse.

Table 1: Nutrients applied to struvite fertilized treatments and control treatment. P, N and Mg content in struvite treatments.

		g/L	P	N	Mg
CONTROL NUTRIENT SOLUTION	KPO_4H_2	13.625			
	KNO3	10.125			
	K2SO4	43.5			
	Ca(NO3)2	16.375			
	CaCl2*2H2O	14.75			
	Mg(NO3)2	22.25			
	Hortrilon	1			
	Sequestrene	1			
PHOSPHOROUS FREE NUTRIENT SOLUTION	KNO3	10.125			
	K2SO4	43.5			
	Ca(NO3)2	16.375			
	CaCl2*2H2O	14.75			
	Mg(NO3)2	22.25			
	Hortrilon	1			
	Sequestrene	1			
STRUVITE	5g		0.625g	0.285g	0.495g
	10g		1.25g	0.57g	0.99g
	20g		2.5g	1.14g	1.98g

Phython script:

```
import cv2
from os import listdir
import numpy as np
from os.path import isfile, join


if __name__ == '__main__':
    carpetaImatges = 'PATH' + '/'
    fitxersImatges = listdir(carpetaImatges)
    for iImatge in range(0, len(fitxersImatges)):
        if fitxersImatges[iImatge][-4:] == '.jpg' or fitxersImatges[iImatge][-4:] == '.png':
            imatge = cv2.imread(carpetaImatges+fitxersImatges[iImatge])
            maskNegre = 255*np.ones((imatge.shape[0],imatge.shape[1]))
            maskNegre[405:730,1014:1549] = 0
            imatge_G = imatge[:,:,1]
            imatge_G = imatge_G < 200


            imatge_G = imatge_G*maskNegre
            cv2.imwrite(carpetaImatges + fitxersImatges[iImatge][:-4] + 'Bin' + '.jpg',imatge_G)
            print('Image: ' + fitxersImatges[iImatge])
            print('Leaves Area: ' + str(np.sum(imatge_G>0)) + ' (' + str(np.sum(imatge_G>0)/(imatge.shape[0]*imatge.shape[1])) + '% of
the image)')
```

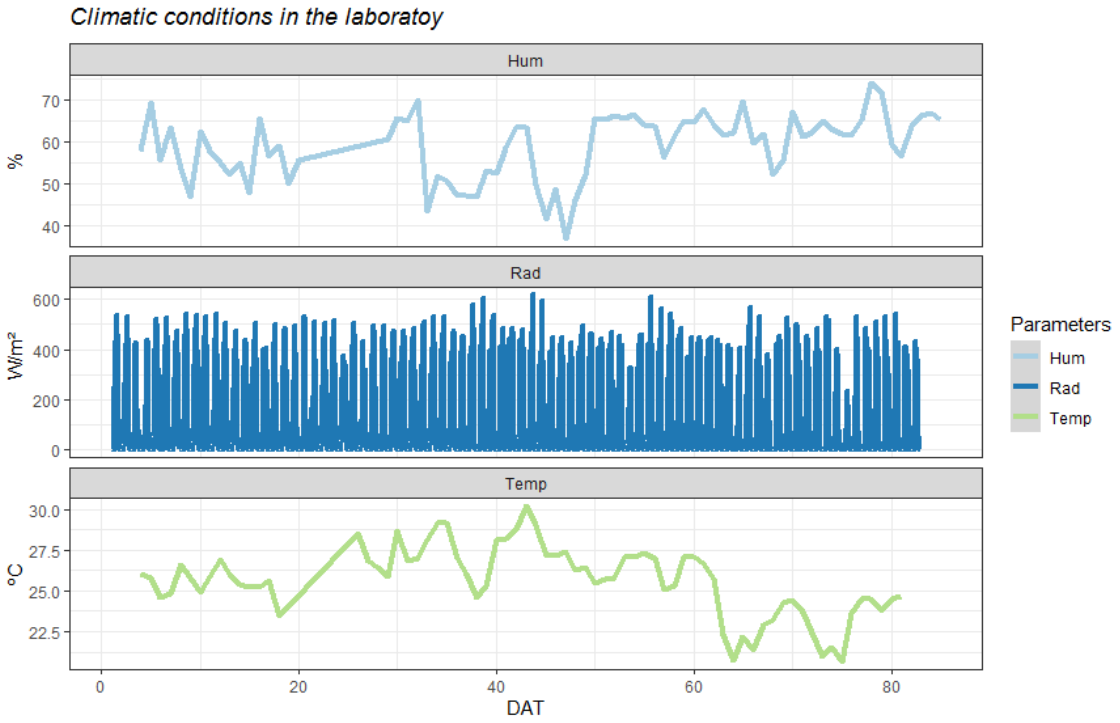

Figure 1: Climatic conditions recorded in the greenhouse laboratory DAT= days after transplanting, Hum= relative humidity (%), Rad = incoming radiation recorded inside the building (W/m²), Temp= Recorded temperature inside the greenhouse (ºC).

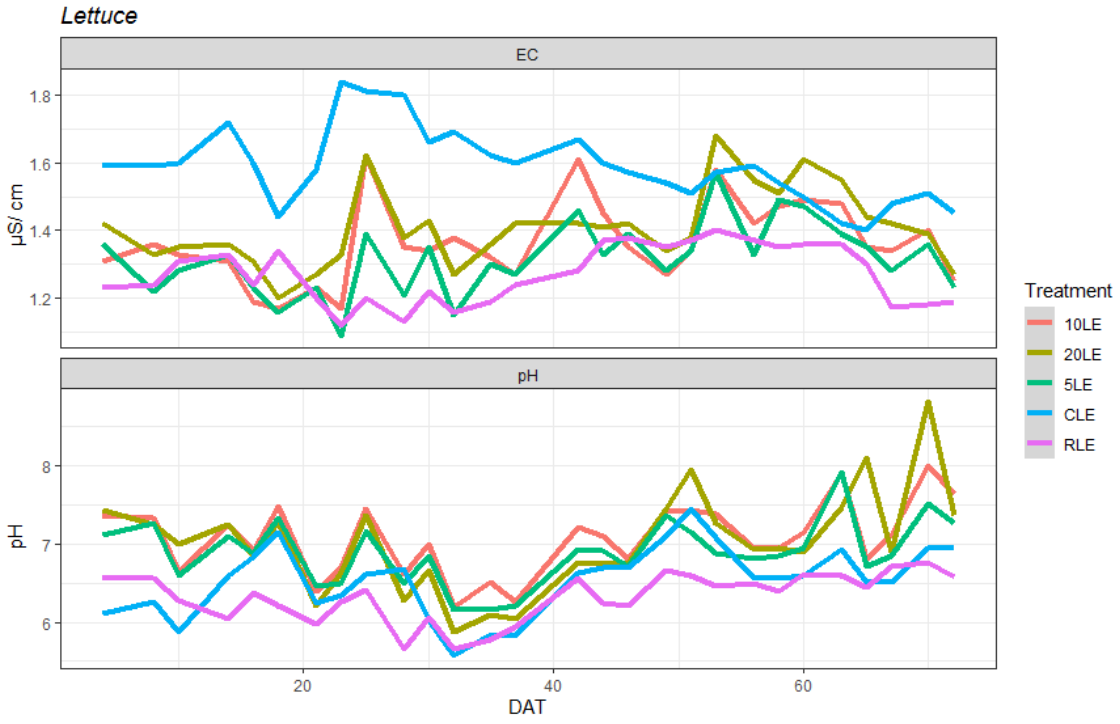

Figure 2: Irrigation and leachate parameters recorded for lettuce production. DAT= days after transplanting, EC= electric conductivity (µS/cm), pH= pH value. Treatments 5LE= leachate from crops fertilized with 5g of struvite, 10LE= leachate from crops fertilized with 10g of struvite, leachate from crops fertilized with 20LE= 20g of struvite, CLE= leachate from control treatment, RLE= irrigated nutrient solution).

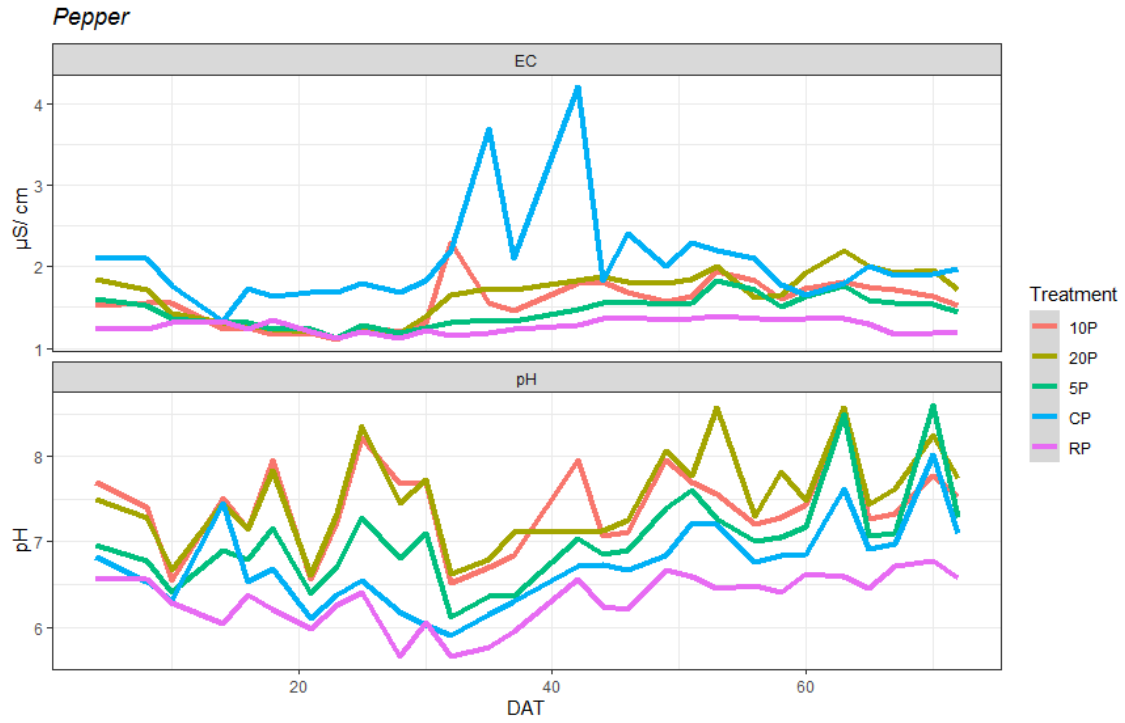

Figure 3: Irrigation and leachate parameters recorded for pepper production. DAT= days after transplanting, EC= electric conductivity (µS/cm), pH= pH value. Treatments 5P= leachate from crops fertilized with 5g of struvite, 10P= leachate from crops fertilized with 10g of struvite, leachate from crops fertilized with 20P= 20g of struvite, CP= leachate from control treatment, RP= irrigated nutrient solution).

Table 2: Lettuce yield recorded from labeled pots (A to O) for all harvests (Sampling 1, 2 and 3), for treatment 5LE (5g), 10LE (10g) and 20LE (20g). Yield differences between samplings 1 (S1) and sampling 2 (S2) as well as sampling 2 and sampling 3 (S3) within the same growing pot given in %.

	1st Sampling	2nd Sampling	3rd Sampling
A	259.7	228.9	130
B	221.8	270.9	140
C	295.2	290.5	155
D	236.8	120	180
E	261.6	223.2	130
F	228.5	211.3	155
G	226.9	245.4	100
H	279.4	198.3	110
I	222.6	226	120
J	267.3	232.8	95
K	235.3	180.8	135
L	232.8	181.8	115
M	313.2	203.5	155
N	106.7	262.7	115
O	183.1	227.6	140

	1st Sampling	2nd Sampling	3rd Sampling
A	271	305.1	165
B	265.2	222	155
C	282.7	280.5	180
D	257.8	253.7	115
E	268.4	243.3	130
F	298	234.3	160
G	286.8	287.2	135
H	256.1	295.1	165
I	283.1	246.2	145
J	302.6	293.3	150
K	307.4	324.5	170
L	269.1	261.9	120
M	263.4	300.6	125
N	274.5	240.6	180
O	226.6	225.6	135

	1st Sampling	2nd Sampling	3rd Sampling
A	254	237.1	210
B	207.1	243.9	230
C	315.3	309.4	160
D	280.6	269.6	40
E	295.3	224.9	205
F	317.2	294.9	175
G	307.5	312.9	225
H	260.1	234.8	145
I	255.3	270.1	130
J	342.8	241.2	150
K	313.4	317.9	200
L	253.4	292.4	170
M	267.6	303.6	160
N	263.4	299.4	155
O	283.3	250.6	190

YIELD DIF	5g	10g	20g
DIF S1-S2	-11%	-2%	-2%
DIF S2-S3	-36%	-44%	-34%

Table 3: Lettuce average production for all harvests (given in g) for treatments 5LE, 10LE, 20LE and CLE. Difference to control calculated for each harvest (given in %).

	5LE	10LE	20LE	CONTROL
1ST HARVEST	225.5	249.8	272.6	250
DIF TO CONTROL	-11%	0%	8%	
2ND HARVEST	224.8	251.6	261.3	279
DIF TO CONTROL	-24%	-11%	-7%	
3RD HARVEST	135.5	143.9	164.7	140.2
DIF TO CONTROL	-3%	3%	15%	

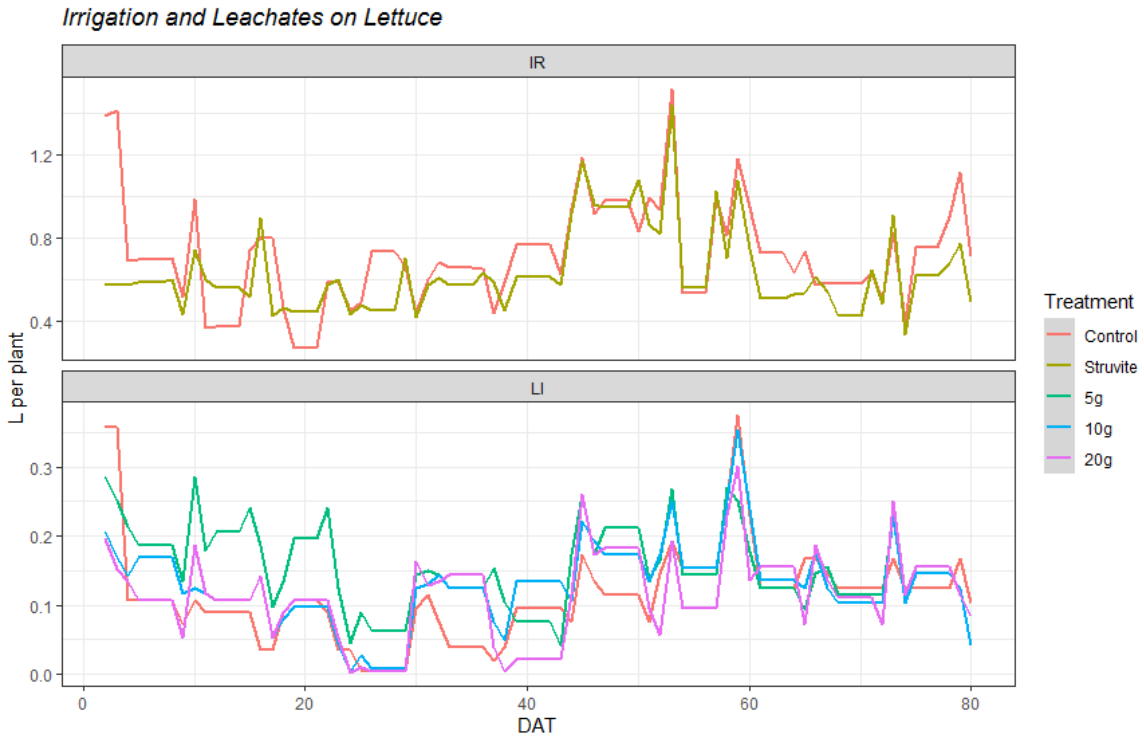

Figure 4: Water flows recorded for the lettuce production. DAT= days after transplanting, IR= irrigated water (L/plant), LI= leachate water (L/plant), 5g= leachates generated from plants fertilized with 5g struvite, 10g= leachates generated from plants fertilized with 10g struvite, 20g= leachates generated from plants fertilized with 20g struvite, Control= leachates generated from control plants and water irrigated to control plants, Struvite= water irrigated to struvite fertilized treatments.

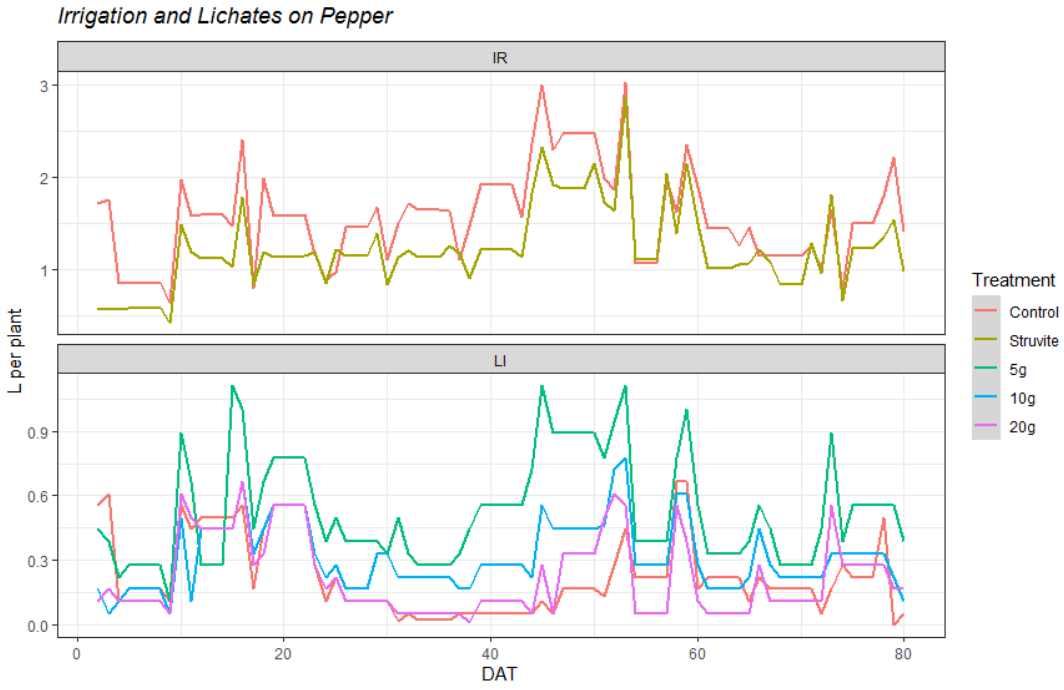

Figure 5: Water flows recorded for the pepper production. DAT= days after transplanting, IR= irrigated water (L/plant), LI= leachate water (L/plant), 5g= leachates generated from plants fertilized with 5g struvite, 10g= leachates generated from plants fertilized with 10g struvite, 20g= leachates generated from plants fertilized with 20g struvite, Control= leachates generated from control plants and water irrigated to control plants, Struvite= water irrigated to struvite fertilized treatments.

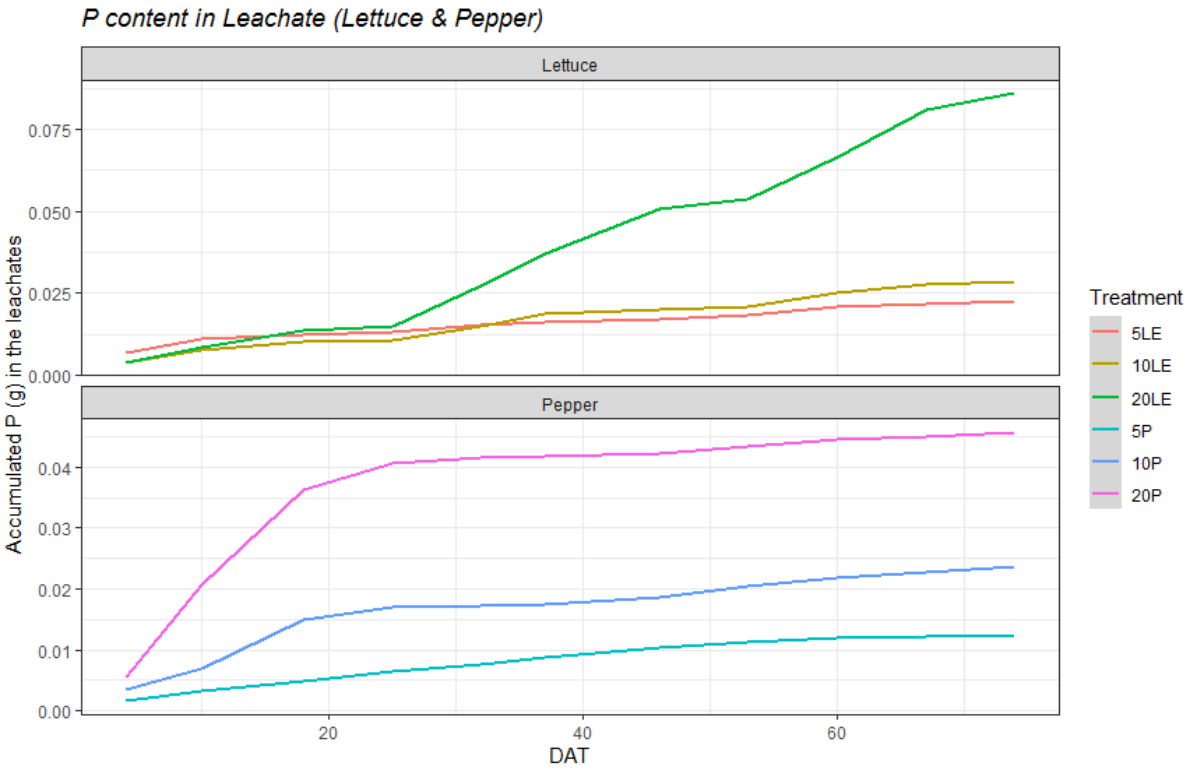

Figure 6: Accumulated P (g) recorded in the leachates generated per lettuce plant. DAT= days after transplanting, 5g= plants fertilized with 5g of struvite, 10g= plants fertilized with 10g of struvite, 20g= plants fertilized with 20g of struvite. Accumulated P (g) recorded in the leachates generated per pepper plant. DAT= days after transplanting, 5g= plants fertilized with 5g of struvite, 10g= plants fertilized with 10g of struvite, 20g= plants fertilized with 20g of struvite.

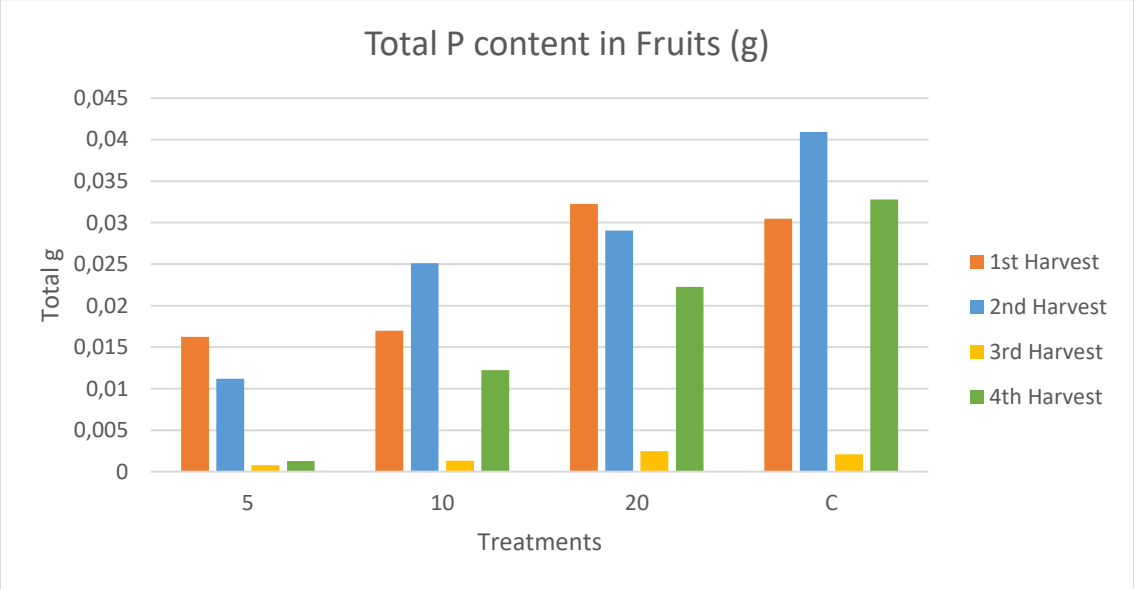

Figure 7: P content (g) in pepper fruit harvests for treatments 5 = plants fertilized with 5g of struvite, 10 = plants fertilized with 10g of struvite, 20 = plants fertilized with 20g of struvite and C= control treatment. Values given for all harvests (1=55 DAT, 2= 62 DAT, 3= 72 DAT and 4= 81 DAT).

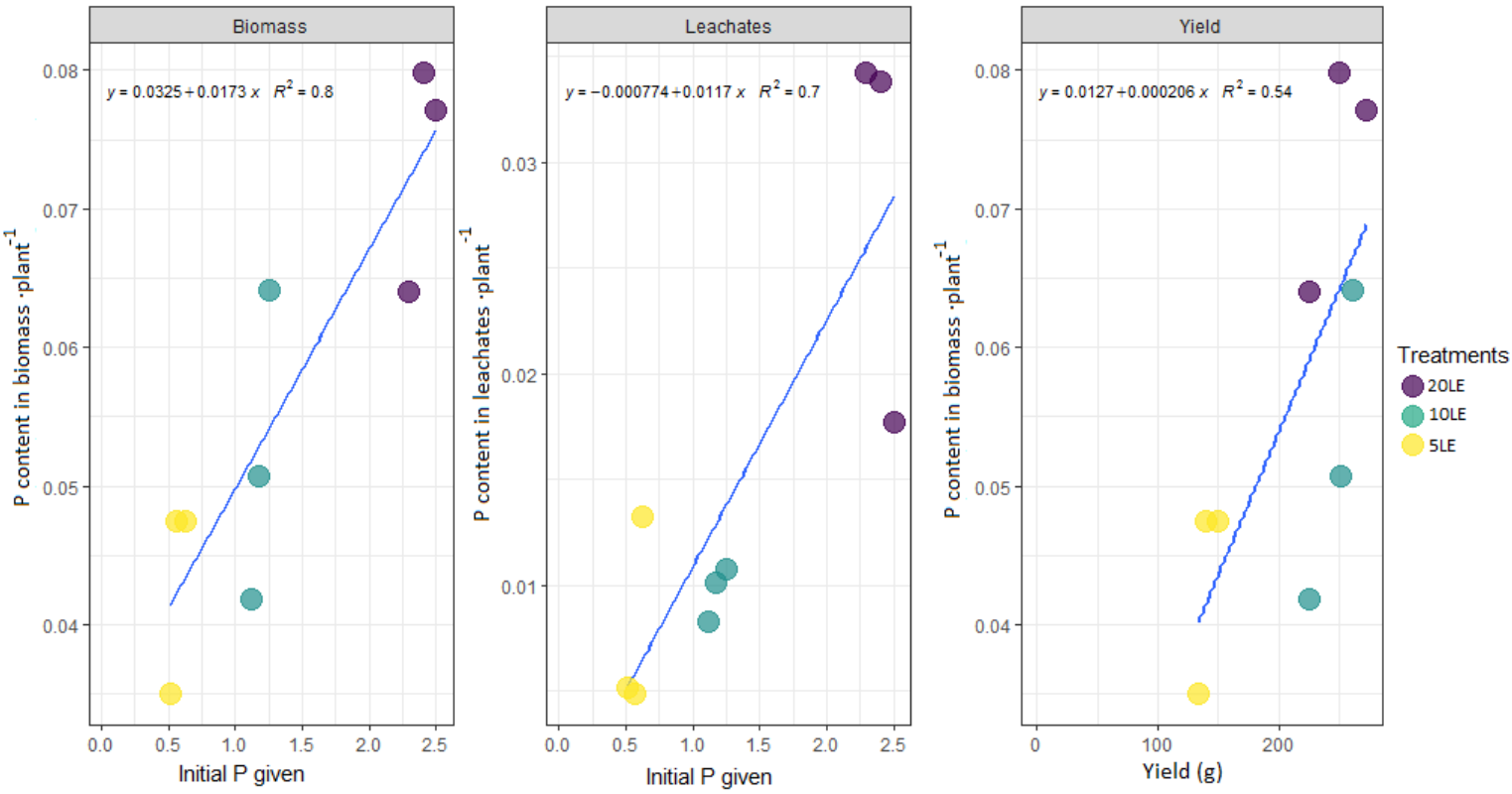

Figure 8: Correlation between the initially given P to the plant (g) and the total P (g) found in the lettuce biomass.

Table 4: Prospection of 9 lettuce crop cycles and balance flows for each cycle for lettuces with initial 20g, 10g and 5g of struvite. Key values labeled as L= P lost in leachates, B = P in lettuce biomass, Y = Prospective yield.

	1st Cycle			2nd Cycle			3rd Cycle			4th Cycle			5th Cycle		
	5g	10g	20g	5g	10g	20g	5g	10g	20g	5g	10g	20g	5g	10g	20g
L:	0.01	0.01	0.02	0.00	0.01	0.03	0.01	0.01	0.03	0.01	0.01	0.03	0.01	0.01	0.02
B:	0.05	0.06	0.07	0.05	0.05	0.08	0.03	0.04	0.06	0.04	0.05	0.07	0.04	0.05	0.07
Y:	225	249	273	224	252	261	133	140	150	171	198	249	169	195	244

	6th Cycle			7th Cycle			8th Cycle			9th Cycle			Total		
	5g	10g	20g	5g	10g	20g	5g	10g	20g	5g	10g	20g	5g	10g	20g
L:	0.01	0.01	0.02	0.00	0.01	0.02	0.00	0.01	0.02	0.00	0.01	0.02	0.05	0.10	0.23
B:	0.04	0.05	0.07	0.04	0.05	0.07	0.04	0.05	0.06	0.04	0.05	0.06	0.36	0.45	0.62
Y:	167	193	240	165	190	236	163	187	232	161	185	228	1580	1790	2113

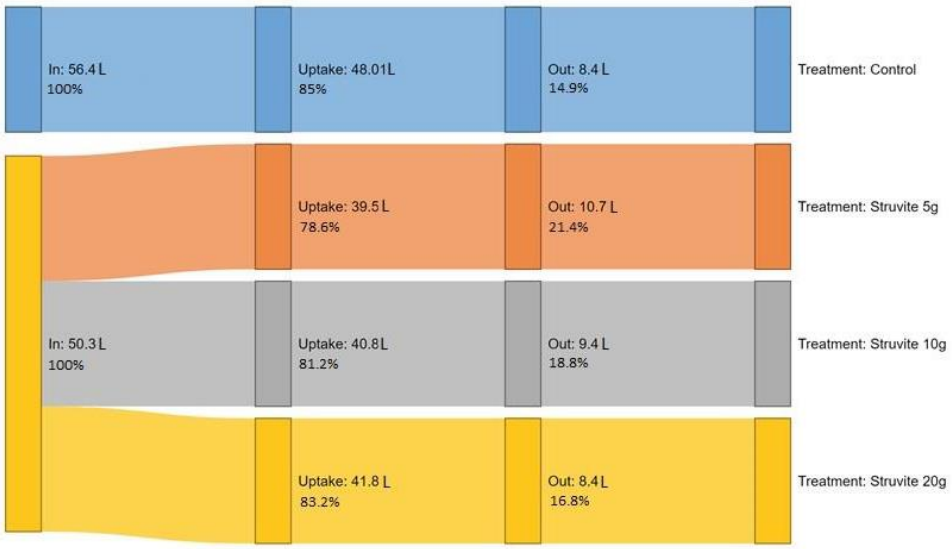

Figure 9: Water balance per Lettuce crop. In = incoming irrigation water, Uptake = evapotranspired and evaporated water, Out = collected leachates a the end of the line.

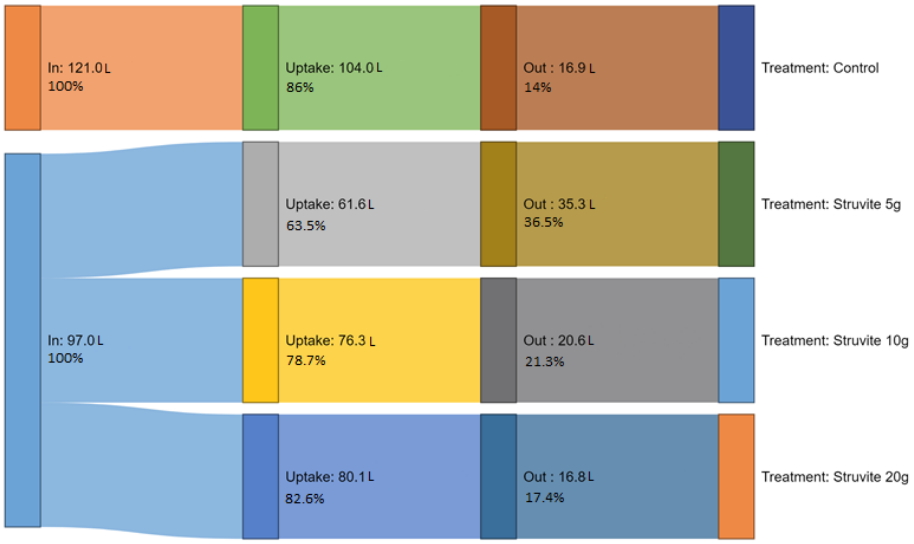

Figure 10: Water balance per Pepper crop. In = incoming irrigation water, Uptake = evapotranspired and evaporated water, Out = collected leachates a the end of the line.

LCA Inventary for treatment 5

5		Per Treatment		Per Plant	
Fertilizers	Materials/assemblies				
60,3% KPO4H2	Phosphate fertiliser, as P2O5 {GLO}| market for | Cut-off, S			0	kg
39,7% KPO4H2	Potassium fertiliser, as K2O {GLO}| market for | Cut-off, S			0	kg
KNO3	Potassium nitrate {GLO}| market for | Cut-off, S		0	0.0048	kg
K2SO4	Potassium sulfate, as K2O {GLO}| market for | Cut-off, S			0.0207	kg
CaNO32	Calcium nitrate {GLO}| market for | Cut-off, S			0.0078	kg
CaCl2	Calcium chloride {RER}| market for calcium chloride | Cut-off, S			0.0070	kg
MgNO32	Magnesium oxide {GLO}| market for | Cut-off, S			0.010	kg
50,7% Hortilon	Iron sulfate {RER}| market for iron sulfate | Cut-off, S			0.00024	kg
23,6% Hortilon	Magnesium oxide {GLO}| market for | Cut-off, S			0.00011	kg
4,7% Hortilon	Zinc monosulfate {RER}| market for zinc monosulfate | Cut-off, S			2.238E-5	kg
18,9% Hortilon	Copper oxide {GLO}| market for | Cut-off, S			9.002E-5	kg
2% Hortilon	Molybdenite {GLO}| market for | Cut-off, S			9.526E-06	kg
Sequestrene	Iron sulfate {RER}| market for iron sulfate | Cut-off, S			0.00047	kg
MgCL2/ NaOH	Struvite			0.14	p
Processes					
Fertilizer Transport	Transport, van <3.5t/RER S			0.01	tkm
Emissions to Air	Ammonia			0.00012	kg
	Dinitrogen monoxide	0.0016			kg
	Nitrogen oxides	0.016			kg
Emissions to Water	Nitrogen			0.79	kg
	Phosphorous			0.022	kg
Pesticides	Materials/assemblies				

Spintor	Pesticide, unspecified {GLO}| market for | Cut-off, S		0	kg
20% Potassium soap	Potassium sulfate, as K2O {GLO}| market for | Cut-off, S		0,04*0,2	kg
80% Potassium soap	Water, deionised, from tap water, at user {Europe without Switzerland}| market for water, deionised, from tap water, at user | Cut-off, S		0,04*0,8	kg
Costar	Pesticide, unspecified {GLO}| market for | Cut-off, S	0		kg
Wettable sulphur	Sulfur {GLO}| market for | Cut-off, S		0	kg
MeemAzal	Pesticide, unspecified {GLO}| market for | Cut-off, S	0		kg
	Processes			
Pesticide Transport	Transport, van <3.5t/RER S		0.02	tkm
Struvite 1kg	Materials/assemblies			
MgO	Magnesium oxide {GLO}| market for | Cut-off, S	0.4239		kg
pH	HCl	0.766		kg
	Sodium hydroxide, without water, in 50% solution state {GLO}| market for | Cut-off, S		0.039	kg
	Tap water, at user/RER S	0.189		kg
	Processes			
Elictricity	Electricity, medium voltage {ES}| market for | Cut-off, S		0.523	kWh
Transport	Transport, van <3.5t/RER S		0.003	tkm

LCA Inventary for treatment 10

10			
Fertilizers	Materials/assemblies		
KNO3	Potassium nitrate {GLO}| market for | Cut-off, S	0	kg
60,3% KPO4H2	Phosphate fertiliser, as P2O5 {GLO}| market for | Cut-off, S	0	kg
K2SO4	Potassium sulfate, as K2O {GLO}| market for | Cut-off, S	0.0048	kg
CaNO32	Calcium nitrate {GLO}| market for | Cut-off, S	0.0207	kg
CaCl2	Calcium chloride {RER}| market for calcium chloride | Cut-off, S	0.0078	kg
MgNO32	Magnesium oxide {GLO}| market for | Cut-off, S	0.0070	kg
50,7% Hortilon	Iron sulfate {RER}| market for iron sulfate | Cut-off, S	0.010	kg
23,6% Hortilon	Magnesium oxide {GLO}| market for | Cut-off, S	0.00024	kg
4,7% Hortilon	Zinc monosulfate {RER}| market for zinc monosulfate | Cut-off, S	0.00011	kg
18,9% Hortilon	Copper oxide {GLO}| market for | Cut-off, S	2.238E-5	kg
2% Hortilon	Molybdenite {GLO}| market for | Cut-off, S	9.002E-5	kg
Sequestrene	Iron sulfate {RER}| market for iron sulfate | Cut-off, S	9.526E-06	kg
39,7% KPO4H2	Potassium fertiliser, as K2O {GLO}| market for | Cut-off, S	0.00047	kg
MgCL2/ NaOH	Struvite	0.28	p
Processes			
Fertilizer Transport	Transport, van <3.5t/RER S	0.01	tkm
Emissions to Air	Ammonia	0.00012	kg
	Dinitrogen monoxide	0.032	kg
	Nitrogen oxides	0.0032	kg
Emissions to Water	Nitrogen	0.447	kg

	Phosphorous	0.028	kg
Pesticides	Materials/assemblies		
Spintor	Pesticide, unspecified {GLO}| market for | Cut-off, S	0	kg
20% Potassium soap	Potassium sulfate, as K2O {GLO}| market for | Cut-off, S	0,04*0,2	kg
80% Potassium soap	Water, deionised, from tap water, at user {Europe without Switzerland}| market for water, deionised, from tap water, at user | Cut-off, S	0,04*0,8	kg
Costar	Pesticide, unspecified {GLO}| market for | Cut-off, S	0	kg
Wettable sulphur	Sulfur {GLO}| market for | Cut-off, S	0	kg
MeemAzal	Pesticide, unspecified {GLO}| market for | Cut-off, S	0	kg
	Processes		
Pesticide Transport	Transport, van <3.5t/RER S	0.02	tkm
Struvite 1kg	Materials/assemblies		
MgO	Magnesium oxide {GLO}| market for | Cut-off, S	0.4239	kg
pH	HCl	0.766	kg
	Sodium hydroxide, without water, in 50% solution state {GLO}| market for | Cut-off, S	0.039	kg
	Tap water, at user/RER S	0.189	kg
	Processes		
Elictricity	Electricity, medium voltage {ES}| market for | Cut-off, S	0.523	kWh
Transport	Transport, van <3.5t/RER S	0.003	tkm

LCA Inventary for treatment 20

20			
Fertilizers	Materials/assemblies		
60,3% KPO4H2	Phosphate fertiliser, as P2O5 {GLO}| market for | Cut-off, S	0	kg
39,7% KPO4H2	Potassium fertiliser, as K2O {GLO}| market for | Cut-off, S	0	kg
KNO3	Potassium nitrate {GLO}| market for | Cut-off, S	0.0048	kg
K2SO4	Potassium sulfate, as K2O {GLO}| market for | Cut-off, S	0.0207	kg
CaNO32	Calcium nitrate {GLO}| market for | Cut-off, S	0.0078	kg
CaCl2	Calcium chloride {RER}| market for calcium chloride | Cut-off, S	0.0070	kg
MgNO32	Magnesium oxide {GLO}| market for | Cut-off, S	0.010	kg
50,7% Hortilon	Iron sulfate {RER}| market for iron sulfate | Cut-off, S	0.00024	kg
23,6% Hortilon	Magnesium oxide {GLO}| market for | Cut-off, S	0.00011	kg
4,7% Hortilon	Zinc monosulfate {RER}| market for zinc monosulfate | Cut-off, S	2.238E-5	kg
18,9% Hortilon	Copper oxide {GLO}| market for | Cut-off, S	9.002E-5	kg
2% Hortilon	Molybdenite {GLO}| market for | Cut-off, S	9.526E-06	kg
Sequestrene	Iron sulfate {RER}| market for iron sulfate | Cut-off, S	0.00047	kg
MgCL2/ NaOH	Struvite	0.56	p
Processes			
Fertilizer Transport	Transport, van <3.5t/RER S	0.12415	tkm
Emissions to Air	Ammonia	0.00021888	kg

	Dinitrogen monoxide	0.000912	kg
	Nitrogen oxides	0.007296	kg
Emissions to Water	Nitrogen	0.0095	kg
	Phosphorous	0.085	kg
Pesticides	Materials/assemblies		
Spintor	Pesticide, unspecified {GLO}| market for | Cut-off, S	0	kg
20% Potassium soap	Potassium sulfate, as K2O {GLO}| market for | Cut-off, S	0,04*0,2	kg
80% Potassium soap	Water, deionised, from tap water, at user {Europe without Switzerland}| market for water, deionised, from tap water, at user | Cut-off, S	0,04*0,8	kg
Costar	Pesticide, unspecified {GLO}| market for | Cut-off, S	0	kg
Wettable sulphur	Sulfur {GLO}| market for | Cut-off, S	0	kg
MeemAzal	Pesticide, unspecified {GLO}| market for | Cut-off, S	0	kg
	Processes		
Pesticide Transport	Transport, van <3.5t/RER S	0.02	tkm
Struvite 1kg	Materials/assemblies		
MgO	Magnesium oxide {GLO}| market for | Cut-off, S	0.4239	kg
pH	HCl	0.766	kg
	Sodium hydroxide, without water, in 50% solution state {GLO}| market for | Cut-off, S	0.039	kg
	Tap water, at user/RER S	0.189	kg
	Processes		
Elictricity	Electricity, medium voltage {ES}| market for | Cut-off, S	0.523	kWh
Transport	Transport, van <3.5t/RER S	0.003	tkm

Table 7: LCA Inventary for the Control treatment

Control			
Fertilizers	Materials/assemblies		
60,3% KPO4H2	Phosphate fertiliser, as P2O5 {GLO}| market for | Cut-off, S	0.221	kg
39,7% KPO4H2	Potassium fertiliser, as K2O {GLO}| market for | Cut-off, S	0.145	kg
KNO3	Potassium nitrate {GLO}| market for | Cut-off, S	0.21	kg
K2SO4	Potassium sulfate, as K2O {GLO}| market for | Cut-off, S	0.59	kg
CaNO32	Calcium nitrate {GLO}| market for | Cut-off, S	0.74	kg
CaCl2	Calcium chloride {RER}| market for calcium chloride | Cut-off, S	0.23	kg
MgNO32	Magnesium oxide {GLO}| market for | Cut-off, S	0.382	kg
50,7% Hortilon	Iron sulfate {RER}| market for iron sulfate | Cut-off, S	0.0111	kg
23,6% Hortilon	Magnesium oxide {GLO}| market for | Cut-off, S	0.005	kg
4,7% Hortilon	Zinc monosulfate {RER}| market for zinc monosulfate | Cut-off, S	0.001	kg
18,9% Hortilon	Copper oxide {GLO}| market for | Cut-off, S	0.004	kg
2% Hortilon	Molybdenite {GLO}| market for | Cut-off, S	0.00044	kg
Sequestrene	Iron sulfate {RER}| market for iron sulfate | Cut-off, S	0.022	kg

Processes			
Fertilizer Transport	Transport, van <3.5t/RER S	3.053572	tkm
Emissions to Air	Ammonia	0.0686	kg
	Dinitrogen monoxide	0.02859	kg
	Nitrogen oxides	0.00287	kg
Emissions to Water	Nitrogen	0.0206	kg
	Phosphorous	0.30	kg
Pesticides	Materials/assemblies		
Spintor	Pesticide, unspecified {GLO}| market for | Cut-off, S	0	kg
20% Potassium soap	Potassium sulfate, as K2O {GLO}| market for | Cut-off, S	0,04*0,2	kg
80% Potassium soap	Water, deionised, from tap water, at user {Europe without Switzerland}| market for water, deionised, from tap water, at user | Cut-off, S	0,04*0,8	kg
Costar	Pesticide, unspecified {GLO}| market for | Cut-off, S	0	kg
Wettable sulphur	Sulfur {GLO}| market for | Cut-off, S	0	kg
MeemAzal	Pesticide, unspecified {GLO}| market for | Cut-off, S	0	kg
	Processes		
Pesticide Transport	Transport, van <3.5t/RER S	0.02	tkm