

Basic Quantitative Roman Lettuce



Lettuce Open field , Roman Quantitative

Crop cycle: 42 Days

Yield goal: 60.00 ton/ha

Plot: Mex san loam

Plot size: 1 ha

Transplanting

Nutrient supply for crop

Stage	Days	Macronutrients(kg/ha)			Secondary Nutrients (kg/ha)			Micronutrients (gram/ha)					
		N_Total	P2O5	K2O	CaO	MgO	SO4	Fe	Mn	Zn	Cu	Mo	B
Transplanting	7	8.47	11.55	3.85	6.16	0.22	4.56	164.34	82.17	27.39	20.54	13.70	0.00

Fertilizers per stage

Fertilizers application (ha/day)

 Haifa MAP - Mono Ammonium Phosphate 2.66 kg	 Haifa SOA Ammonium Sulphate 899 gram	 Multi-npK 13-2-44 Multi-K Enriched 1.24 kg
 Haifa Mag / Magnisal Magnesium Nitrate 203 gram	 Haifa Cal GG Calcium Nitrate 3.32 kg	 Haifa Micro Combi 326 gram

Nutrigation system

 **Tank 1**
Volume: **1000 liter**
Content: **Phosphorus**
Injection volume per day: **24.04 l/day**
Fertilizer concentration: **20 %**
Tanks per stage: **tanks**

 **Tank 2**
Volume: **1000 liter**
Content: **Calcium**
Injection volume per day: **19.27 l/day**
Fertilizer concentration: **20 %**
Tanks per stage: **tanks**

Haifa MAP - Mono Ammonium Phosphate **110.83 kg**

Haifa Mag / Magnisal Magnesium Nitrate **10.53 kg**

Haifa SOA Ammonium Sulphate **37.40 kg**

Haifa Cal GG Calcium Nitrate **172.53 kg**

Multi-npK 13-2-44 Multi-K Enriched **51.77 kg**

Haifa Micro Combi **16.94 kg**

Stock solution nutrients content:

Tanks	Macronutrients (gram/liter)			Secondary Nutrients (gram/liter)			Micronutrients (mg/liter)					
	N_Total	P2O5	K2O	CaO	MgO	SO4	Fe	Mn	Zn	Cu	Mo	B
Phosphorus Tank 1	28.04	68.64	22.88	-	-	27.12	-	-	-	-	-	-
Calcium Tank 2	27.85	-	-	45.72	1.63	-	1220	610	200	150	100	-

Fertilizers amounts for growth stage (per plot)

 Haifa MAP - Mono Ammonium Phosphate 18.65 kg	 Haifa SOA Ammonium Sulphate 6.29 kg	 Multi-npK 13-2-44 Multi-K Enriched 8.71 kg	 Haifa Mag / Magnisal Magnesium Nitrate 1.42 kg	 Haifa Cal GG Calcium Nitrate 23.25 kg	 Haifa Micro Combi 2.28 kg
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Amount

Vegetative

Nutrient supply for crop

Stage	Days	Macronutrients(kg/ha)			Secondary Nutrients (kg/ha)			Micronutrients (gram/ha)					
		N_Total	P2O5	K2O	CaO	MgO	SO4	Fe	Mn	Zn	Cu	Mo	B
Vegetative	14	69.30	30.80	30.80	15.40	0.55	154.90	438.24	219.12	73.04	54.78	36.52	0.00

Fertilizers per stage

Fertilizers application (ha/day)



Haifa MAP - Mono Ammonium Phosphate
3.44 kg



Haifa SOA Ammonium Sulphate
15.26 kg



Multi-nPK 13-2-44 Multi-K Enriched
4.98 kg



Haifa Mag / Magnisal Magnesium Nitrate
253 gram



Haifa Cal GG Calcium Nitrate
4.15 kg



Haifa Micro Combi
435 gram

Nutrigation system



Volume: **1000 liter**
Content: **Phosphorus**
Injection volume per day: **118.40 l/day**
Fertilizer concentration: **20 %**
Tanks per stage: **tanks**



Volume: **1000 liter**
Content: **Calcium**
Injection volume per day: **24.15 l/day**
Fertilizer concentration: **20 %**
Tanks per stage: **tanks**

Haifa MAP - Mono Ammonium Phosphate **29.08 kg**

Haifa SOA Ammonium Sulphate **128.88 kg**

Multi-nPK 13-2-44 Multi-K Enriched **42.04 kg**

Haifa Mag / Magnisal Magnesium Nitrate **10.48 kg**

Haifa Cal GG Calcium Nitrate **171.56 kg**

Haifa Micro Combi **17.97 kg**

Stock solution nutrients content:

Tanks	Macronutrients (gram/liter)			Secondary Nutrients (gram/liter)			Micronutrients (mg/liter)					
	N_Total	P2O5	K2O	CaO	MgO	SO4	Fe	Mn	Zn	Cu	Mo	B
Phosphorus Tank 1	36.15	18.58	18.58	-	-	93.44	-	-	-	-	-	-
Calcium Tank 2	27.69	-	-	45.46	1.62	-	1290	650	220	160	110	-

Fertilizers amounts for growth stage (per plot)



Haifa MAP - Mono Ammonium Phosphate

48.20 kg



Haifa SOA Ammonium Sulphate

213.65 kg



Multi-nPK 13-2-44 Multi-K Enriched

69.68 kg



Haifa Mag / Magnisal Magnesium Nitrate

3.54 kg



Haifa Cal GG Calcium Nitrate

58.11 kg



Haifa Micro Combi

6.09 kg

Amount

Initiation head formation

Nutrient supply for crop

Stage	Days	Macronutrients(kg/ha)			Secondary Nutrients (kg/ha)			Micronutrients (gram/ha)					
		N_Total	P2O5	K2O	CaO	MgO	SO4	Fe	Mn	Zn	Cu	Mo	B
Initiation head formation	14	77.00	30.80	30.80	15.40	0.55	181.48	328.68	164.34	54.78	41.08	27.39	0.00

Fertilizers per stage

Fertilizers application (ha/day)



Haifa MAP - Mono Ammonium Phosphate
3.44 kg



Haifa SOA Ammonium Sulphate
17.88 kg



Multi-npK 13-2-44 Multi-K Enriched
4.98 kg



Haifa Mag / Magnisal Magnesium Nitrate
253 gram



Haifa Cal GG Calcium Nitrate
4.15 kg



Haifa Micro Combi
326 gram

Nutrigation system



Volume: **1000 liter**
Content: **Phosphorus**
Injection volume per day: **131.49 l/day**
Fertilizer concentration: **20 %**
Tanks per stage: **tanks**



Volume: **1000 liter**
Content: **Calcium**
Injection volume per day: **23.61 l/day**
Fertilizer concentration: **20 %**
Tanks per stage: **tanks**

Haifa MAP - Mono Ammonium Phosphate **26.18 kg**

Haifa SOA Ammonium Sulphate **135.97 kg**

Multi-npK 13-2-44 Multi-K Enriched **37.85 kg**

Haifa Mag / Magnisal Magnesium Nitrate **10.72 kg**

Haifa Cal GG Calcium Nitrate **175.50 kg**

Haifa Micro Combi **13.79 kg**

Stock solution nutrients content:

Tanks	Macronutrients (gram/liter)			Secondary Nutrients (gram/liter)			Micronutrients (mg/liter)					
	N_Total	P2O5	K2O	CaO	MgO	SO4	Fe	Mn	Zn	Cu	Mo	B
Phosphorus Tank 1	36.73	16.73	16.73	-	-	98.58	-	-	-	-	-	-
Calcium Tank 2	28.33	-	-	46.51	1.66	-	990	500	170	120	80	-

Fertilizers amounts for growth stage (per plot)



Haifa MAP - Mono Ammonium Phosphate

48.20 kg



Haifa SOA Ammonium Sulphate

250.32 kg



Multi-npK 13-2-44 Multi-K Enriched

69.68 kg



Haifa Mag / Magnisal Magnesium Nitrate

3.54 kg



Haifa Cal GG Calcium Nitrate

58.11 kg



Haifa Micro Combi

4.56 kg

Amount

Head closing

Nutrient supply for crop

Stage	Days	Macronutrients(kg/ha)			Secondary Nutrients (kg/ha)			Micronutrients (gram/ha)					
		N_Total	P2O5	K2O	CaO	MgO	SO4	Fe	Mn	Zn	Cu	Mo	B
Head closing	7	4.40	22.37	11.00	0.00	0.00	11.75	109.56	54.78	18.26	13.70	9.13	0.00

Fertilizers per stage

Fertilizers application (ha/day)



Haifa SOP Potassium Sulphate
3.08 kg



Haifa MAP - Mono Ammonium Phosphate
5.24 kg



Haifa Micro Combi
217 gram

Nutrigation system



Volume: **1000 liter**
Content: **Phosphorus**
Injection volume per day: **41.59 l/day**
Fertilizer concentration: **20 %**
Tanks per stage: **tanks**



Volume: **1000 liter**
Content: **Calcium**
Injection volume per day: **43.40 l/day**
Fertilizer concentration: **0.5 %**
Tanks per stage: **tanks**

Haifa SOP Potassium Sulphate **74.07 kg**

Haifa Micro Combi **5.00 kg**

Haifa MAP - Mono Ammonium Phosphate **125.93 kg**

Stock solution nutrients content:

Tanks	Macronutrients (gram/liter)			Secondary Nutrients (gram/liter)			Micronutrients (mg/liter)					
	N_Total	P2O5	K2O	CaO	MgO	SO4	Fe	Mn	Zn	Cu	Mo	B
Phosphorus Tank 1	15.11	76.81	37.78	-	-	40.37	-	-	-	-	-	-
Calcium Tank 2	-	-	-	-	-	-	360	180	60	50	30	-

Fertilizers amounts for growth stage (per plot)



Haifa SOP Potassium Sulphate

21.57 kg



Haifa MAP - Mono Ammonium Phosphate

36.67 kg



Haifa Micro Combi

1.52 kg

Amount

Total nutrient supply for season

Stage	Days	Macronutrients(kg/ha)			Secondary Nutrients (kg/ha)			Micronutrients (gram/ha)						Irrigation	
		N_Total	P2O5	K2O	CaO	MgO	SO4	Fe	Mn	Zn	Cu	Mo	B	Interval (Days)	Volume (m3/ha/day)
Transplanting	7	8.47	11.55	3.85	6.16	0.22	4.56	164.34	82.17	27.39	20.54	13.70	0.00	1	1
Vegetative	14	69.30	30.80	30.80	15.40	0.55	154.90	438.24	219.12	73.04	54.78	36.52	0.00	1	1
Initiation head formation	14	77.00	30.80	30.80	15.40	0.55	181.48	328.68	164.34	54.78	41.08	27.39	0.00	1	1
Head closing	7	4.40	22.37	11.00	0.00	0.00	11.75	109.56	54.78	18.26	13.70	9.13	0.00	1	1
Total	42	159.17	95.52	76.45	36.96	1.32	352.69	1040.82	520.41	173.47	130.10	86.74	0.00		

Total for season per plot

Stage	Transplanting	Vegetative	Initiation head formation	Head closing	Total
 Multi-nPK 13-2-44 Multi-K Enriched	8.71 kg	69.68 kg	69.68 kg	-	148.06 kg
 Haifa SOP Potassium Sulphate	-	-	-	21.57 kg	21.57 kg
 Haifa SOA Ammonium Sulphate	6.29 kg	213.65 kg	250.32 kg	-	470.27 kg
 Haifa MAP - Mono Ammonium Phosphate	18.65 kg	48.20 kg	48.20 kg	36.67 kg	151.72 kg
 Haifa Mag / Magnisal Magnesium Nitrate	1.42 kg	3.54 kg	3.54 kg	-	8.50 kg
 Haifa Cal GG Calcium Nitrate	23.25 kg	58.11 kg	58.11 kg	-	139.47 kg
 Haifa Micro Combi	2.28 kg	6.09 kg	4.56 kg	1.52 kg	14.46 kg

Environmental Footprint

Environmental parameters

	Haifa-fertigation	Topsoil application	Fertigation rating performance
Env. Footprint single score $\mu\text{Pt/Kg produce}$	9.25e+3	8.59e+3	EQUAL
Carbon footprint kg CO2 eq./Kg produce	2.67e-2	4.96e-2	EXCELLENT
N leaching kg NO3/Kg produce	4.64e-5	3.36e-4	EXCELLENT
N runoff kg NO3/Kg produce	4.49e-6	4.04e-5	EXCELLENT
N volatilization kg NH3/Kg produce	3.22e-5	6.38e-4	EXCELLENT
Eutrophication, freshwater kg P eq./Kg produce	2.31e-5	5.52e-5	EXCELLENT

*INDEX (Fertigation vs Topsoil)

EXCELLENT	BETTER	EQUAL	BAD	WORSE
>30%	10 to 30%	10 to -10%	-10 to -30%	<-30%

* % Difference between fertigation and topsoil application

NutriNet calculates the difference between the environmental footprint of fertigation programs compared to top-soil fertilizer application. In both cases NutriNet uses the same field characteristics, however, fertilizer composition is different and thus the overall values of the environmental footprint are different.