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# SEASOL® IMPROVES WATER USE EFFICIENCY IN LETTUCE

## KEY FINDINGS

Independent trials with Seasol® have shown that it can help lettuce grow normally under water stressed conditions.

### Key findings:

1. Lettuce fresh weight was maintained at lower irrigation rates with Seasol®
2. Seasol® demonstrated improved water use efficiency
3. Seasol® improved root mass and root length
4. Seasol® improved chlorophyll content

## WHAT IS SEASOL®

Seasol® is a seaweed-based biostimulant. When it is applied to seeds, plants, or the rhizosphere, Seasol® stimulates natural processes to enhance nutrient

uptake, nutrient efficiency, tolerance to abiotic stress, and crop quality.

The primary ingredient in Seasol® is Australian Bull Kelp (*Durvillaea potatorum*).

## TRIAL DESIGN AND METHODOLOGY

The following treatments were compared:

1. Lettuce at recommended irrigation rate with Seasol®
2. Lettuce at recommended irrigation rate (*Control 1*)
3. Lettuce at 80% of recommended irrigation rate with Seasol®
4. Lettuce at 80% of recommended irrigation rate (*Control 2*)
5. Lettuce at 60% of recommended irrigation rate with Seasol®
6. Lettuce at 60% of recommended irrigation rate (*Control 3*)

The information contained in this publication is based on greenhouse studies conducted on cos lettuce. The information presented here may not cover all possible factors that can influence the growth of lettuce and other crops. Producers are advised to consider their unique climate, soil type, growing conditions, and other relevant factors (e.g., seed supply and quality, sowing equipment) when making agronomic decisions. Reliance on information provided in this fact sheet is entirely at your own risk. Applied Horticultural Research will not be liable for any loss, damage, injury, claim, expense, or costs (including legal costs), arising in any way from any person's use or non-use of any information contained in this fact sheet.



14cm pots were laid out in a randomised block design with 18 replicates per treatment in a climate-controlled glasshouse. Lettuce were grown from uniform cos lettuce seedlings transplanted into sandy loam soil and fertilised with superphoska and calcium nitrate. Irrigation rates were determined by soil moisture sensors and irrigated by hand with measured volumes. Seasol® (commercial grade) was applied by pipette at 5L/ha every 14 days. Lettuce were harvested 8 weeks after planting and assessed for plant weight, height, root mass, chlorophyll and nutrients.

## RESULTS

Seasol® improved the water use efficiency of lettuce.

Without Seasol® applied, there was a statistically significant ( $p < 0.05$ ) 20.5% (30.8g) drop in fresh weight from the recommended 100% irrigation rate to 60% irrigation rate. **However, when Seasol® was applied there was no reduction in fresh weight when 60% or 80% of the irrigation requirement was applied.**

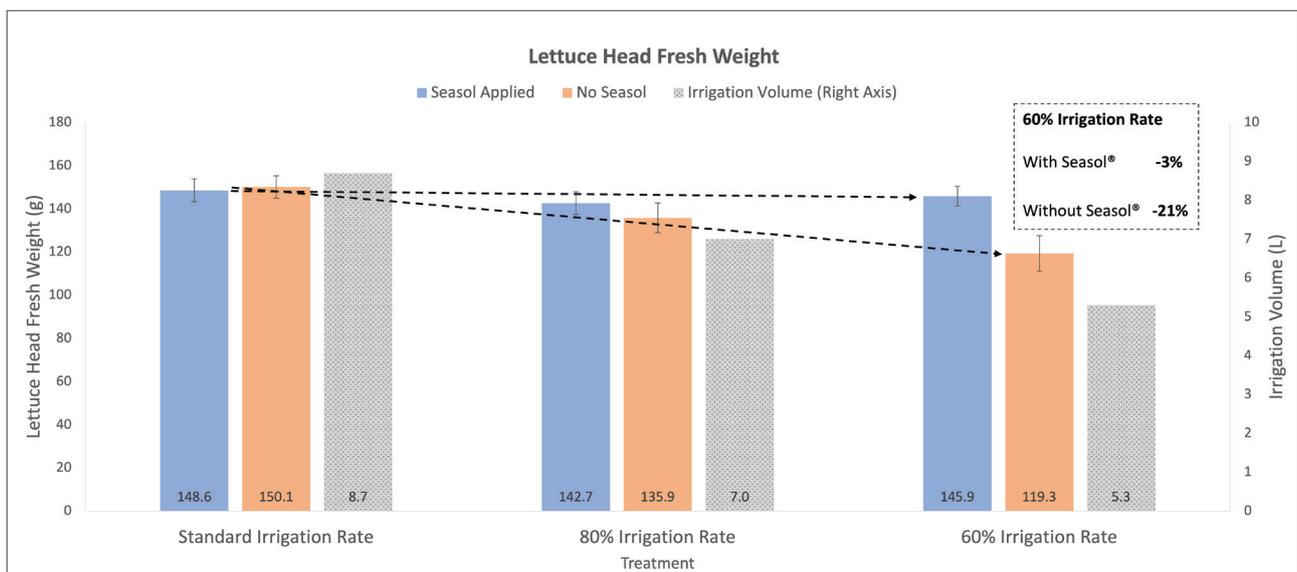
Seasol® therefore increased the fresh weight of lettuce by 22% in a water stressed environment, with a 2.8% reduction in yield potential.



Lettuce grown in a climate controlled glasshouse.



Hand watering of lettuce by beaker.



Lettuce head fresh weights at different irrigation rates. Total irrigation volumes are shown in grey. Error bars denote standard error.



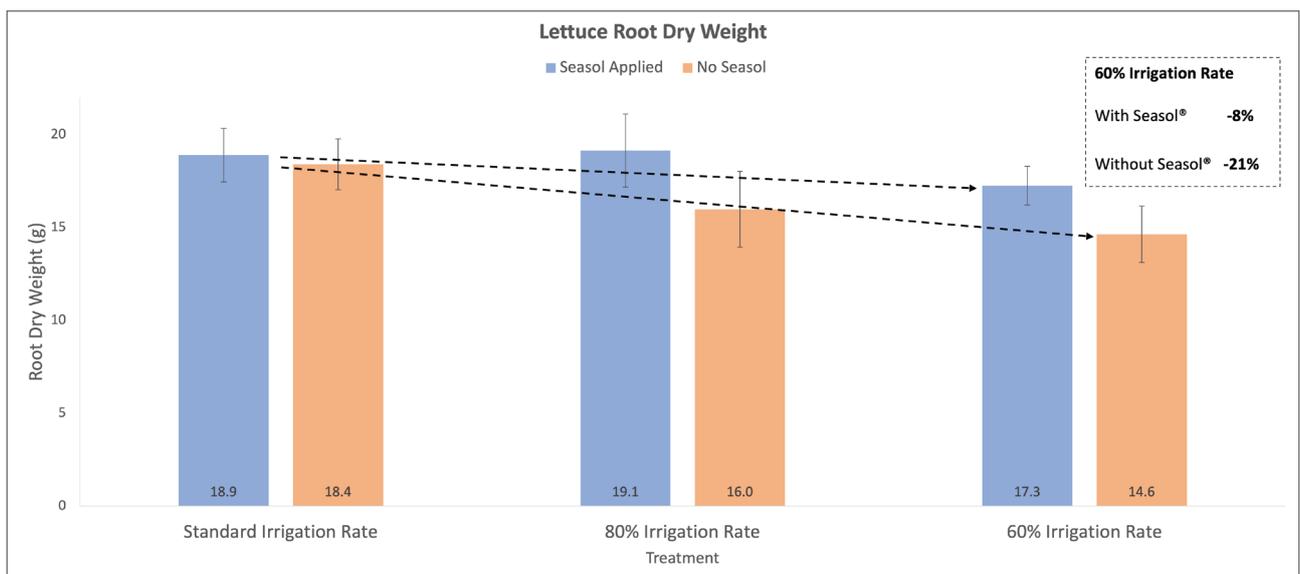
Lettuce head and root mass at 60% irrigation without Seasol® (top) and with Seasol® (bottom)



Lettuce head and root mass at 100% irrigation without Seasol® (top) and with Seasol® (bottom)

The treated lettuce also had longer, heavier roots and a consistently higher chlorophyll content compared to untreated lettuce, indicating improved drought resistance.

The results showed that water-stressed treatments produced reduced yields compared to standard irrigation treatments, indicating successful manipulation of plant growth through irrigation volumes.



Lettuce root dry weights at different irrigation rates. Error bars denote standard error.

## SUMMARY TABLE OF KEY RESULTS FROM THE SEASOL® WATER USE EFFICIENCY TRIAL

Treatment		Head Fresh Weight (g)		Head Dry Weight (g)		Root Dry Weight (g)		Root Length (cm)		Head Height (cm)		SPAD		n
		Average	Std Error	Average	Std Error	Average	Std Error	Average	Std Error	Average	Std Error	Average	Std Error	
Seasol Applied	Standard Irrigation Rate	148.6	5.3	16.9	0.4	18.9	1.4	32.1	1.1	35.0	1.5	29.7	0.6	18
No Seasol	Standard Irrigation Rate	150.1	5.1	16.6	0.7	18.4	1.4	32.7	1.9	34.8	1.8	27.6	0.8	18
Seasol Applied	80% Irrigation Rate	142.7	5.2	14.8	0.4	19.1	2.0	32.2	1.2	33.4	1.2	31.0	0.8	18
No Seasol	80% Irrigation Rate	135.9	6.9	14.7	0.3	16.0	2.0	29.6	1.3	33.5	1.3	29.1	0.8	18
Seasol Applied	60% Irrigation Rate	145.9	4.6	13.8	0.4	17.3	1.0	28.1	1.5	30.9	1.2	33.1	0.9	18
No Seasol	60% Irrigation Rate	119.3	8.3	12.5	0.3	14.6	1.5	26.9	1.3	30.2	1.2	31.3	0.6	18

### SIMILAR RESEARCH

The outcomes of this research are similar to the results from other studies on the water use efficiency benefits of seaweed extracts. Examples of this research are:

[Battacharyya, D., Babgohari, M.Z., Rathor, P. and Prithiviraj, B., 2015. Seaweed extracts as biostimulants in horticulture. \*Scientia Horticulturae\*, 196, pp.39-48.](#)

[Spann, T.M. and Little, H.A., 2011. Applications of a commercial extract of the brown seaweed \*Ascophyllum nodosum\* increases drought tolerance in container-grown 'Hamlin'sweet orange nursery trees. \*HortScience\*, 46\(4\), pp.577-582.](#)

[Almaroai, Y.A. and Eissa, M.A., 2020. Role of marine algae extracts in water stress resistance of onion under semiarid conditions. \*Journal of Soil Science and Plant Nutrition\*, 20, pp.1092-1101.](#)

### CONCLUSION AND RECOMMENDATIONS

Seasol® can be recommended to reduce the effect of stress on lettuce production in water limited environments. Based on this research with cos lettuce in sandy loam soil, a similar fresh weight was achieved despite a 40% reduction in irrigation when Seasol® was applied. There is a significant body of international research confirming the benefits on water use efficiency or drought tolerance using seaweed extracts.

Reduced irrigation rates can save fertiliser nutrients by limiting nutrient leaching through the soil profile.

Water use efficiency may become important in Australia in 2024 and beyond as El Niño becomes more likely.

It is recommended to first trial Seasol® on your own property to see it how performs under your growing conditions. You could also combine this with a reduced

irrigation rate to understand how much water you could save and what impact this will have on your yield and quality. Remember to include a control plot with no Seasol® so you can compare the differences!

### DISCLAIMER

Applied Horticultural Research was commissioned by Seasol® International to conduct independent research on the water use efficiency of Seasol®. Applied Horticultural Research will only promote the use of specific brands when there is clear evidence of efficacy.



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