



# Increased growth response of strawberry roots to a commercial extract from *Durvillaea potatorum* and *Ascophyllum nodosum*

Victorian Strawberry Industry Certification Authority



Scott Mattner<sup>1</sup>, Mirko Milinkovic<sup>1</sup>, Larissa Coridas<sup>1</sup>, Cora Zon<sup>1</sup>, Sarah Payne<sup>1</sup>, Tony Arioli<sup>2</sup>

<sup>1</sup> Victorian Strawberry Industry Certification Authority, Toolangi, Australia

<sup>2</sup> Seasol International, Bayswater, Australia

## 1: Introduction

The loss of soil fumigants like methyl bromide is forcing strawberry growers to consider alternative ways of producing crops. Soil fumigation causes an 'increased growth response' in strawberry roots, which in turn supports healthy plants and high yields. We hypothesized that the use of seaweed extracts could increase the root growth of strawberry plants, and contribute to an integrated approach for crop production.

## 2: Methods

From 2013 to 2016, we conducted a total of five field trials on strawberry farms in the nursery sector at Toolangi and the fruit sector at Coldstream in Victoria, Australia. We applied a commercial seaweed extract from *Durvillaea potatorum* and *Ascophyllum nodosum* (Seasol®) as a monthly drench (10 L/ha in a 1:400 solution) to two cultivars of strawberry ('Fortuna' and 'Albion'), compared with an untreated control. In the nursery sector, we measured transplant (runner) yield and lateral root density (feeder roots) on harvested runners. In the fruit sector, we measured fruit yield through the season (January - June), and root length density (root length per volume of soil). A laboratory trial was also conducted using a time-lapse system to capture images and determine the root growth of strawberry plants (cv. 'Albion') in the seaweed extract (1:400 dilution) and water.

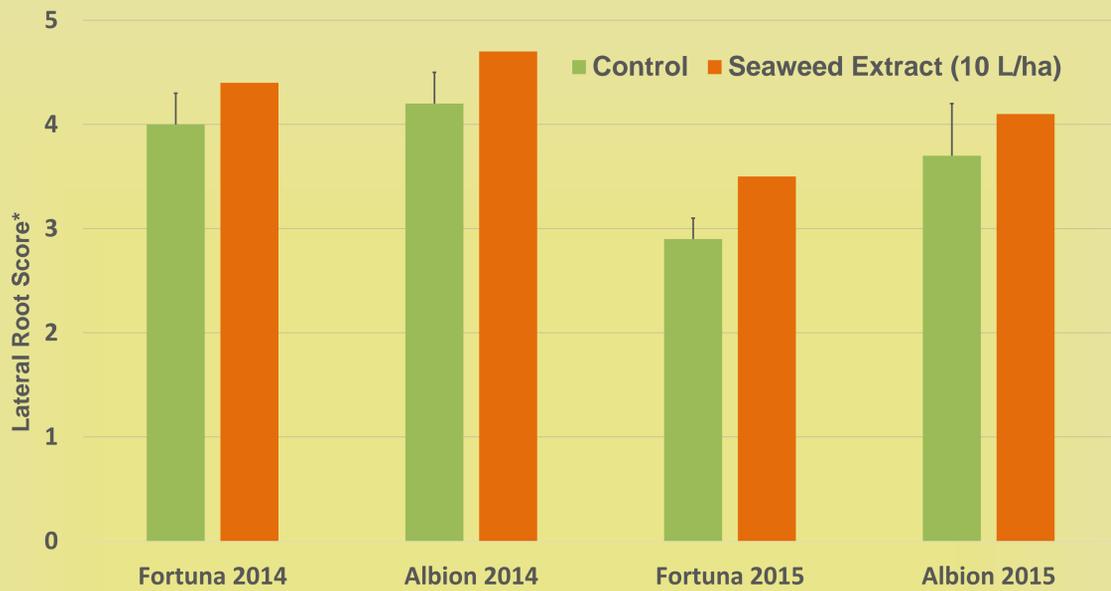


FIG. 1: Lateral root score\* of strawberry runners (cv.s 'Fortuna' and 'Albion') harvested from field trials conducted at Toolangi, Australia in 2014 and 2015. Error bars are the least significant differences, where  $p = 0.05$ .

\* Lateral root score described by Wing et al. (1995). Higher numbers mean greater number and quality of lateral roots

## 3: Response of Strawberry in the Field

In the nursery sector, use of the extract significantly increased the density of lateral roots on harvested runners by up to 22% (Fig 1). Treatment with the extract also significantly increased yields of marketable runners by 8-19% (Fig 2). In the fruit sector, use of the extract significantly increased the root length density of strawberry plants by 38%, marketable fruit yields by 8%, and revenue from fruit by A\$0.30 (Table 1). Root length density at final harvest and marketable fruit yield of strawberry were highly correlated ( $r = 0.94$ ). We observed that use of the extract reduced the incidence of post-harvest rots (mostly caused by *Botrytis cinerea*) in incubated strawberry fruit by 10% (Fig 3).



FIG. 2: Yield (plants/m of row) of strawberry runners (cv.s 'Fortuna' and 'Albion') harvested from field trials conducted at Toolangi, Australia in 2014 and 2015. Error bars are the least significant differences, where  $p = 0.05$ .

TABLE 1: Root length density and fruit yields and revenue in a field trial at Coldstream, Victoria in 2016.

Treatment	Root Length Density (cm root/cm <sup>3</sup> soil)	Total Fruit Yield (g/plant)	Revenue (A\$/plant)
Control	4.70 a	502.7 a	3.79 a
Seaweed Extract (10 L/ha)	6.55 b	547.6 b	4.10 b



FIG. 3: Post-harvest rots in fruit treated with Seaweed Extract (L) and control (R).

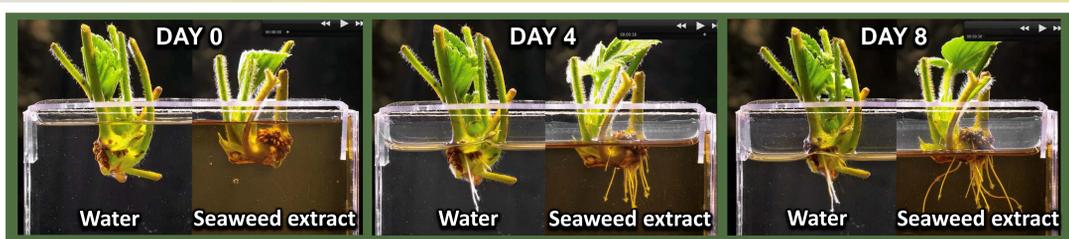


FIG. 4: Time-lapse photography shows incremental growth rates of strawberry roots when grown in a seaweed extract (1:400) and water.

## 4: Response of Strawberry in the Laboratory

Root growth was enhanced in the seaweed extract compared with water (Fig 4). We observed fungal endophytes growing from strawberry plants in the experimental system. It is possible that the seaweed extract interacted with these organisms to influence

root growth.

## 5: Conclusions

Overall these results demonstrate: (i) a relationship between increased root growth from a seaweed extract and improved yields of strawberry, and (ii) the benefits of the integrated use of seaweed extracts like Seasol® in strawberry production.