

INFLUENCE OF FOLIAR SPRAYING WITH SEAWEED PRODUCTS ON THE GROWTH AND MINERAL NUTRITION OF RYE AND CABBAGE

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ABSTRACT. *Leafspraying seaweed products on the growth and mineral nutrition of rye and cabbage.*

At high fertilization levels leafspraying with seaweed resulted in a significant increase in growth of and nutrient uptake by rye plants, whereas cabbage showed little or no effect. The effect of seaweed leaf sprays was also dependent on the concentration at which it was applied.

Leafspraying with seaweed products has been practised overseas for quite some time now, and large increases in growth and harvest yields have purportedly been achieved on a range of crops. The stimulation of growth and nutrient uptake that results is ascribed to the influence of plant hormones in the seaweed. Seaweed products are now also manufactured and marketed locally, but no information on their influence on plants is available. This investigation was carried out to gain information on the effect of seaweed foliar spraying under local conditions.

PROCEDURE

A loamsoil of the Fernwood type was used for the test and was fertilized with two levels of 3:1:5 (38) mixture at 0,042 and 0,42 g per 350 g of soil. The soil was mixed with the same weight of acid-washed sand, put into plastic pots, and then seven rye or cabbage seeds per pot were planted. After two weeks the plants were thinned to three per pot. Seaweed foliar spraying was carried out fortnightly at dilutions of 1:330, 1:500 and 1:1000. The seaweed *Ecklonia Maxima* was used for the preparation of the material. Control plants were simultaneously sprayed with a KNO_3 solution with the same N concentration as the 1:500 seaweed dilution, i.e. 3,95 ppm N. A commercial wetting agent was added to all spray solutions. The soil surface was not shielded whilst spraying with the result that some of the material landed on the soil.

The experiment was set out in random factorial design, with three repetitions, and the plants were grown in a gauze enclosure under natural climatic conditions for eight weeks. Roots and shoots were harvested separately, dried at 100°C and the dry weight determined. Thereafter the plant material was dry-ashed, dissolved in 1:1 HCl and diluted with de-ionised water. Concentrations of Calcium, Magnesium, Potassium, Zinc and Copper were determined by absorption or emission spectrometry whilst Phosphate was determined calorimetrically.

RESULTS AND DISCUSSION

Results are presented in Fig. 1 and 2. At the high fertilizer level the dry mass of the shoots of rye (Fig. 1a), which were sprayed with the 1:500 and 1:1000 seaweed dilutions, were increased by 50% and 85% respectively when compared to the control plants sprayed with KNO_3 . Seaweed foliar spraying at a dilution of 1:330, however, did not have a significant effect on the dry mass of the rye shoots, whilst rye at the low fertilizer level was also not significantly influenced. The cabbage shoots, on the other hand, were not significantly influenced, at either fertilizer levels, by foliar spraying. However, the increase in fertilizer level led to an increase of two to six times in the dry mass of shoots.

Root growth of rye (Fig. 1b) in the high fertilizer level was more than doubled by spraying with seaweed at dilutions of 1:330 and 1:1000. Spraying at a dilution of 1:500, however, showed no significant influence. At the high fertilizer level the root growth of cabbage, sprayed with the 1:330 dilution of seaweed, showed more than double an increase compared to the control. The influence of foliar spraying on the growth of cabbage roots decreases, however, at greater dilutions of the seaweed, so that at the 1:500 dilution the increase was 50% and at the 1:1000 dilution only 20%. Against this, an increase in fertilizer level led to increases of two- to eightfold in the rootgrowth. At the low fertilizer level foliar spraying did not significantly influence the rootgrowth of either rye or cabbage.

Nutrient uptake (Fig. 2) by rye and cabbage was increased by two- to thirteenfold by the increase in fertilizer level. In the case of rye there was, at the higher fertilizer level, a further significant increase in the uptake of Ca, Mg, K and P in the seaweed sprayed plants compared to the control. The influence of the seaweed spray, for all these elements, was enhanced with greater dilutions, and the increase in nutrient uptake at a dilution of 1:1000 was approximately double that of the control. Zinc and copper uptake, in the