Seaweed extracts as possible agents in improving the emergence of barley, oats and maize in Northern Ireland

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Introduction A combination of factors such as rising fertiliser prices, precarious world food supplies, climate change and restrictions on pesticide usage (due to resistance problems and EU regulation) has led to pressures on agricultural scientists to examine more sustainable options. One potential area is that of biostimulants, products which stimulate the plant's own defence systems to allow it to cope better with stress induced by such factors as salinity, drought, pests, diseases and temperature extremes. One of these, temperature, has particular relevance to N. Ireland where low temperatures in the spring affect the growth and emergence of forage maize. The area of the crop has expanded in recent years, but further expansion is constrained by the high cost of either growing under polythene or waiting until the frost risk has passed. Faster crop emergence could also help to suppress weed growth of temperate cereals, such as oats and barley, when grown under organic conditions. This paper reports on initial attempts to use extracts (biostimulants), derived from seaweed, to improve emergence in barley, oats and maize.

Material and methods In the first experiment, seeds of barley (cv. Westminster) and oats (cv. Firth) were either soaked for 18 h in water or a range of seaweed extracts (obtained from *Palmaria palmata*, *Delesseria sanguinea*, *Porphyra* sp., *Laminaria* sp. or *Ulva lactuca* by maceration in cold water) or in distilled water or left unsoaked. Ten seeds were then sown out in each of 15 cm diam. pots filled with peat-based compost, placed in a growth cabinet with 12 h light; 12h dark at 15°C and observed for emergence (out of 10). There were five replicates. In the second experiment, maize seeds (cv. Goldcob) were similarly treated, but with a range of commercially available seaweed products (Algifol (Neomed Pharma GmbH), Algaegreen (Oilean Glas Teo, Co. Donegal), Ecolicitor and Nematec (Bioatlantis Ltd., Co. Kerry)). Pots were placed in a growth cabinet at 10°C and again observed for emergence. There were six replicates. All data were analysed by Analysis of Variance using Genstat version 12.1.

Results In the first experiment, barley seedlings, grown at 15°C, emerged significantly more quickly following treatment with a range of seaweed products than when treated with either distilled water (water control) or left untreated (dry control) (Fig. 1). Although results for oats were in a similar direction they were not significant. Maize, grown at 10°C, germinated significantly faster when it had been pre-treated with a range of commercial seaweed extracts compared with water and dry controls (Fig,. 2).

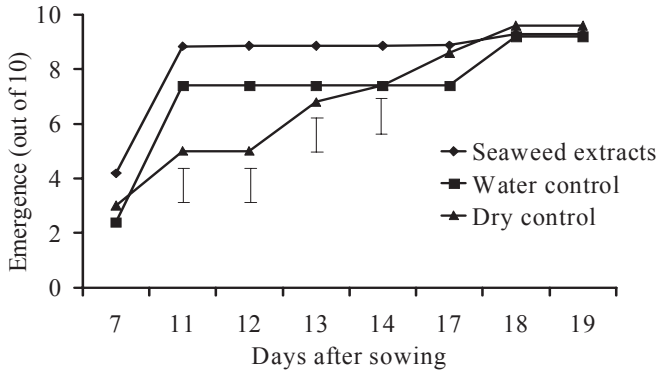

Figure 1 Effect of seaweed extracts (meaned over products) on emergence of barley seedlings at 15°C. L.s.d. at 5% for comparison between extracts and controls

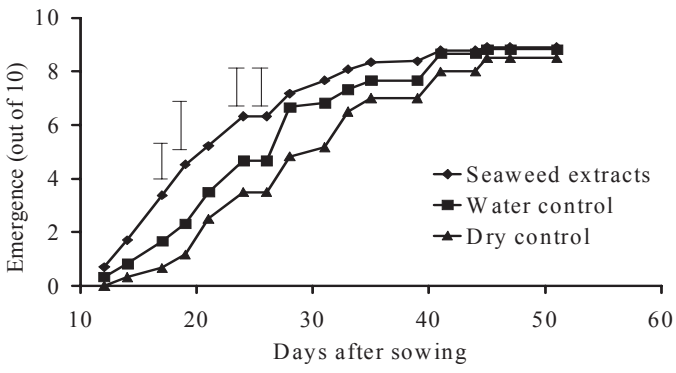

Figure 2 Effect of seaweed extracts (meaned over products) on emergence of maize seedlings at 10°C. L.s.d. at 5% for comparison between extracts and controls

Conclusions These results indicate some potential for enhancement of emergence of a range of cereals with extracts obtained from seaweeds, and are similar to those obtained by Farooq *et al*. (2008), who found that priming maize seeds with salicylic acid improved emergence and uniformity both at its optimal temperature for growth (27°C) and at 15°C. However, as Khan *et al*. (2009) have indicated, the biostimulatory potential of many seaweed products has not been exploited due to lack of scientific data on growth factors and their mode of action. Further basic research is therefore needed before this potentially valuable bioresource could be exploited commercially as an emergence promoter.

References

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