Kelp - independent research

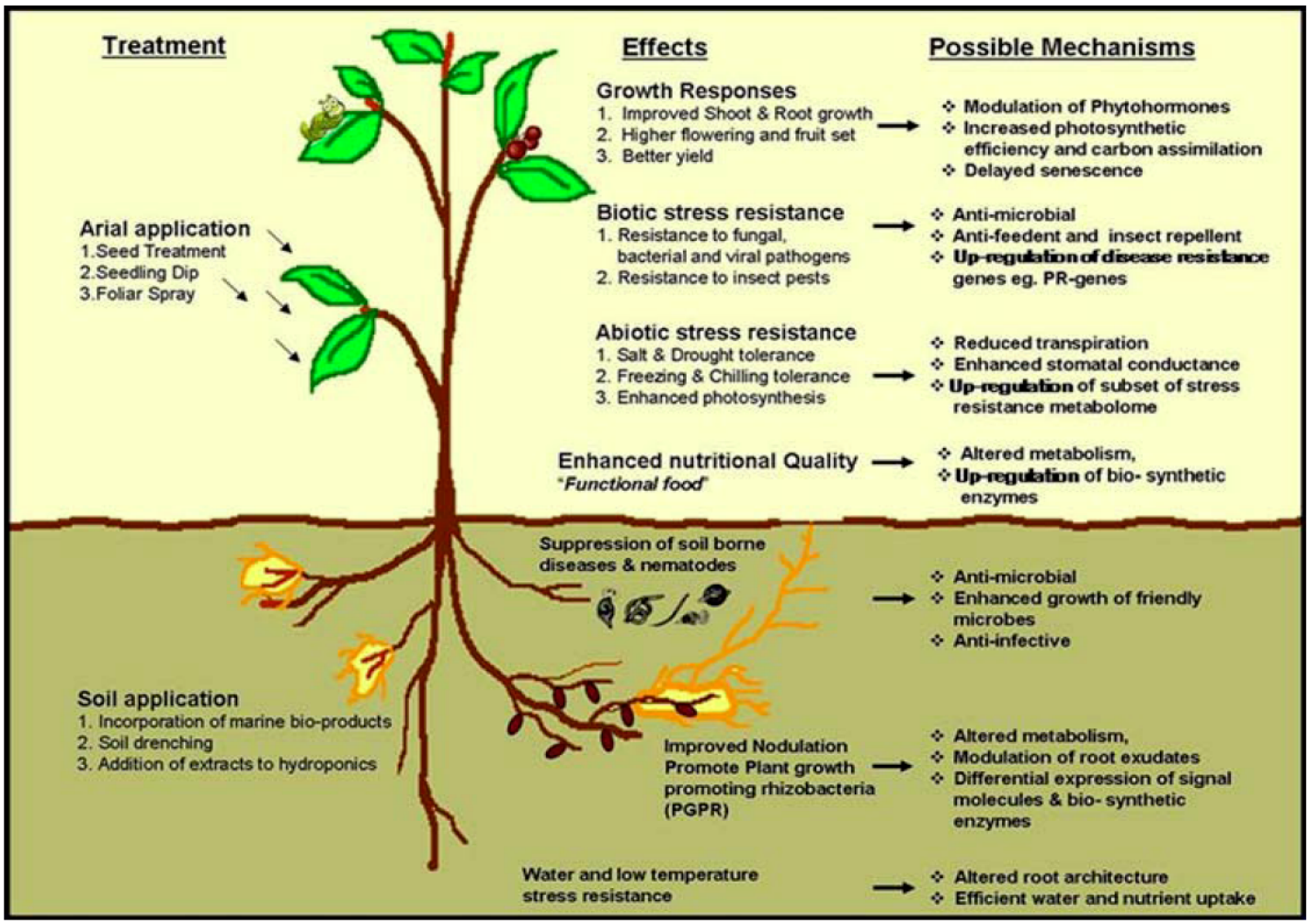
Background

Kelp has been used as a soil conditioner for centuries. In 2006, 15 million metric tonnes of seaweed products were produced annually as biostimulants or biofertilisers to increase plant growth.

Numerous studies have revealed a wide range of beneficial effects of seaweed extract applications on plants, such as early seed germination and establishment, improved crop performance and yield, elevated resistance to biotic and abiotic stress, and enhanced postharvest shelf-life of perishable products (see next page).

Kelp components such as macro- and microelemental nutrients, amino acids, vitamins, cytokinins, auxins, betaines, alginates, sterols and abscisic acid affect cellular metabolism in plants that lead to enhanced growth and yield. These extracts are bioactive at low concentrations (diluted as 1: 1000). See Khan, 2009 for a review of modes of action of these components of Kelp.

Summary of Effect and Mechanisms of Kelp - Khan (2009)



Next page has a summary of research with references ...

Summary of Independent Research

Growth Responses

- Growth enhancement over control - more advanced developmental stage - Khan et al 2009
- Improved root growth at low concentrations 0.1g/L - Rayorath et al 2008
- Improved root growth more pronounced when Kelp applied at early growth stage - Jeannin et al, 1991
- Improves root, show and biomass accumulation - Nelson 1986
- Improves nutrient uptake by roots resulting in root systems with improved water and nutrient efficiency -Crouch et al 1990
- Growth enhancement - more advanced developmental stage, plant height and number of leaves increased - Rayorath 2008
- Increases in fruit yield and quality - 30% tomatoes, 50% marigolds, increase harvestable yield lettuce, increase heart size of cauliflower florets, yield increases barley, peppers, beans 24%, Thompsons seedless grapes over 3 years (60% yield increase, 13% fruit size) - Khan 2009
- Treating cuttings of flowering plants increased dry weight of roots - Crouch 1991
- Decrease transplant shock in seedlings of marigold, cabbage, tomato by increasing root size and vigour - Khan, 2009, Crouch et al, 1992)

Biotic Stress Resistance

- Enhance plant defence against pest and diseases - Allen 2001
- Imparts nematode resistance possibly by altering the auxin:cytokinin ratio in the plant - Khan 2009
- Kelp contains elicitors (eg polysaccharides) which plants use to protect themselves against pathogen invasion. This is thought to be why Kelp has been show to reduce disease pressure in plants (Khan 2009 - summary of research showing disease resistance)
- Alginates in Kelp promote growth of beneficial fungi which colonise roots and result in stronger plants -Kuwada 2006

Abiotic Stress Resistance - Heat, Cold, Frost

- Kelp increases chlorophyll ie improves photosynthesis (Betaines thought to be responsible) - Blunden 1997
- Improve moisture-holding capacity and promote the growth of beneficial soil microbes (Alginates in Kelp involved) - Khan 2009
- Cytokinins in Kelp induce heat tolerance - Ervin 2004
- Kelp enhances Potassium uptake which also induces heat tolerance - Ervin 2004
- Increased antioxidant capacity of plant with Kelp which helps plant in temperature extremes - Fike 2001
- Kelp is generally considered to offer an extra degree or two tolerance to frost; although some information suggests as high as 3-4^{0}C . Lowers the temperature at which cells will freeze This is because it is a highly effective brix builder. Plants with higher sugar content have a lower freezing point. - Wilson 2001
- Cytokinins & Betaines increase turgidity of cell walls ie water less likely to flow out of cells - Khan , 2009
- Acts as “anti-freeze” - research suggests seaweed has digests that trigger the hardening off response plants have in winter -Khan, 2009

References - independent international research - call us for a copy.

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