

FORAGE FOCUS

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PGG Wrightson Seeds

Brassica Seed Treatment

Sowing treated brassica seed is a simple and cost effective means of helping ensure your brassica crop establishes successfully and that they have every opportunity to reach their genetic potential in terms of yield and quality.

The establishment period of a brassica crop is a critical time in determining what yield a crop will achieve, and therefore how profitable or unprofitable the crop will be. It is at this time that plants are most vulnerable to factors such as insect pests, plant fungal pathogens, nutritional, climatic and seedbed conditions, all of which can significantly reduce crop performance resulting in poor yields or outright crop failure.

The application of certain chemicals and nutrients to brassica seed helps protect seedlings against insect pests and fungal pathogens, and counter nutrient disorders early in crop life. This treatment of the seed improves seedling establishment and has significant effects on crop yield and profitability.

An alternative to seed treatment is to use granular insecticides and soil-drenching fungicides, products which are not typically very user friendly to handle. Comparatively, seed treatment offers a highly targeted application method in which only small quantities of active ingredient are required per unit area thus having significant environmental benefits. Systemic protectants are used, meaning that the chemicals are absorbed by the roots and transported to the leaves via the sap. Thus seed treatment gives excellent pest and disease control, while having no adverse effect on beneficial insects and soil organisms such as earthworms.

Brassica crop establishment threats

There are a number of pests and diseases that can affect brassica crops during the germination and seedling stages of crop establishment.

Invertebrate Insect Pests

Common insect pests of brassica crops during establishment include springtails (two species – garden springtail & clover flea), argentine stem weevil (ASW), aphids (various species including cabbage aphid), wheat bug (*Nysius spp.*), grass grubs and cutworm¹. Various seed treatments offer excellent control of springtails, ASW, aphids and *Nysius*, while grass grub and cutworms need to be controlled through cultivation, or by use of granular insecticides or post-emergence sprays. Slugs are also a major invertebrate pest of brassica crops, predominantly in no-tillage situations, and require control by baiting.

Springtails are the most common and most voracious pests, particularly when crops are sown after pasture. Springtails have been counted in numbers of 30,000/m², with up to 1,000 eggs/m² at the time of crop establishment*. Damage can begin as soon as the seed shell is shed and the cotyledons (two first juvenile leaves) are exposed. Stems supporting the cotyledons are often damaged before the cotyledons appear above the ground, causing cotyledons to fall from the plant. Cotyledon damage appears first on the leaf edge, then as small pits or shot holes in the leaf, with cotyledons being completely destroyed by high springtail populations.

The seed treatments SUPERSTRIKE®, ULTRASTRIKE™ and Gaucho® all offer excellent protection against springtails. ULTRASTRIKE™ and Gaucho® also provide protection against aphids, ASW and *Nysius*.

Feeding Springtail



Feeding Cabbage Aphid



¹ Wrightson Seeds Brassica Technical Manual

* Addison, P.J. Nufarm Technical Specialist

Plant Fungal Pathogens

The soil is habitat for enormous numbers of very common bacterial and fungal pathogens with a great diversity of host plants. Their populations in the soil are dynamic, varying according to whether conditions suit a particular species at any particular time. Because they are so small and therefore hard to see, the role of fungal pathogens in reducing crop yields is largely underestimated.

There are a number of fungal pathogens that affect germinating seedlings, the symptoms of attack often being referred to as 'damping-off', characterised by poor or uneven crop emergence. Seedlings can be killed at germination or post-germination, before or after they emerge from the soil. The 'damping off' pathogens include *Fusarium spp.*, which is favoured in dry soil conditions, and *Pythium spp.* and *Rhizoctonia solani spp.*, favoured by moist conditions. They are present in cultivated seedbeds and are particularly active in no-tillage situations where they thrive on dying and decaying plant material.

SUPERSTRIKE® and ULTRASTRIKE™ seed treatments contain fungicides that protect against the 'damping-off' pathogens *Fusarium spp.*, *Pythium spp.* and *Rhizoctonia solani spp.*

Hyphae of damping-off disease *Rhizoctonia solani*



Nutrient Disorders

Molybdenum is an essential trace element for general brassica growth that is often overlooked in starter fertiliser recommendations. It is involved in the plant in conversion of nitrate ions (most plant nitrogen is taken up in this form) to ammonium. Symptoms of deficiency are similar to nitrogen deficiency, where the growing points become stunted and leaves become pale green to purple with yellow mottles, narrow and cupped. In extreme cases of molybdenum deficiency a condition called 'whiptail' can occur where leaf area development is reduced while the central stem remains.

Molybdenum deficiency should be confirmed with a plant tissue test, but can be overcome by increasing pH (increases soil availability of molybdenum) or including sodium molybdate with the base fertiliser.

SUPERSTRIKE® & ULTRASTRIKE™ include molybdenum in the formulation to allow growing point and leaf development of seedlings to proceed unhindered, and to help prevent 'whiptail' developing.

Establishment of brassica seed (under springtail pressure)



Untreated brassica

Superstrike® treated brassica

Seed Treatment Technology

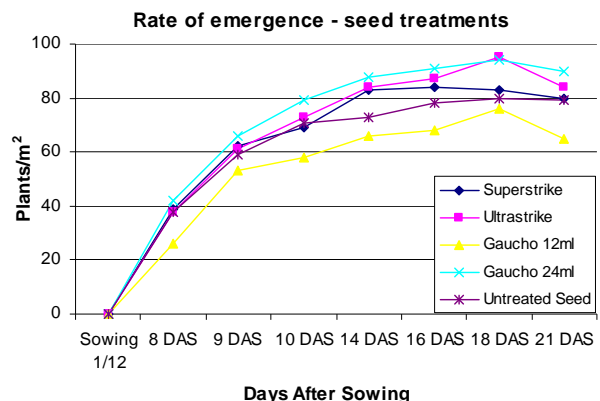
Seed coatings were historically based on heavy lime coatings around the seed, primarily for improving seed ballistics from aerial oversowing. These mass-increasing lime coatings are still being used in special cases and have been improved to significantly increase seed emergence in oversowing situations (see information on PRILLCOTE® seed coatings).

More recently the focus has moved to seed treatment using chemical protection for specific pests and diseases. Significant investment has been made into formulations and application technology to create 'filmcote' treatments that protect the seed from pests and disease while not having detrimental effects on seedling emergence. This technology advance means that treated brassica seed can now be sown at the same sowing rates as untreated seed.

Effects of Seed Treatment on Brassica Seedling Emergence

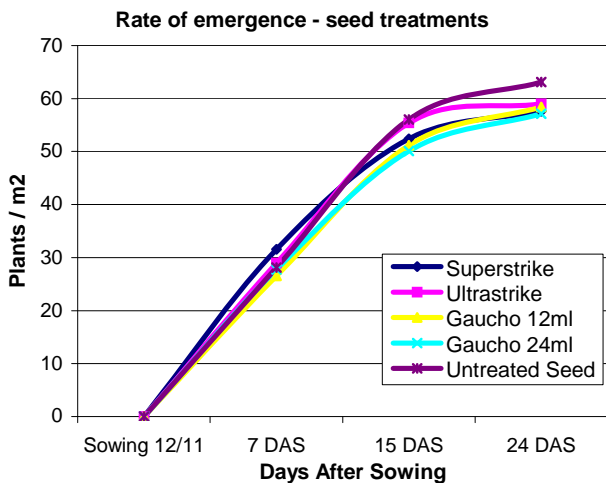
Scientific trials have been repeated since spring 2003 to test the effect of seed treatment on seedling rate of emergence under dryland conditions. The trials included the commercial brassica seed treatments: SUPERSTRIKE®, ULTRASTRIKE™, Gaucho® 24ml and Gaucho® 12ml in addition to untreated seed. The trials at Kimihia Research Centre, Canterbury (cultivation) and Aorangi Research Centre, Manawatu (no-tillage) have found repeatedly that **seed treatments have no negative effect on the rate of emergence of brassica crops** (see graphs 1 & 2). NB. The trials were carried out in pest-free environments, through the application of granular insecticide and continuous crop monitoring, so that only the rate of seedling emergence was being measured.

Graph 1: Rate of emergence of different seed treatments sown at 10mm depth. Sown 1/12/03. (Canterbury).



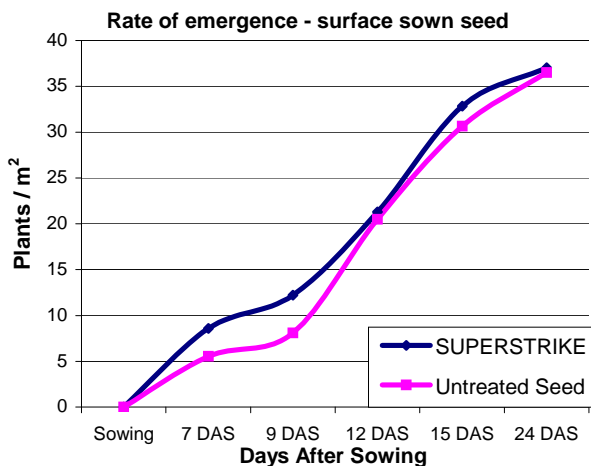


Graph 2: Rate of emergence of different seed treatments sown at 10mm depth. Sown 12/11/04 by cross-slot drill. (Manawatu).



Trials that were run in the same period at Aorangi Research Centre have shown that there is no significant difference between untreated seed and SUPERSTRIKE® treated seed that was sown on the soil surface during very dry conditions (see graph 3). Note that surface sowing of seed is not best practice because of the significant fluctuation in moisture availability in this zone.

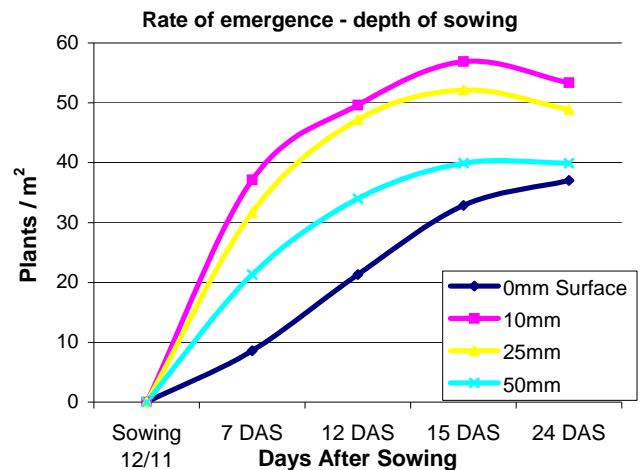
Graph 3: Rate of emergence of Superstrike® and untreated seed, surface sown in dry conditions. Sown 12/11/04 by cross-slot drill (Manawatu).



Effects of Sowing Depth on Seedling Brassica Emergence

While the trials show conclusively that seed treatment has no significant effect on the rate of emergence, there can at times be a variation in the rate of emergence of brassica seedlings as a result of other variables related to the soil and seedbed dynamics that can cause variable crop emergence. Changes in soil types, soil characteristics (eg. structure, compaction, friability and soil water retention) and seedbed factors (eg. consolidation, tilth, residue and depth of sowing) all have significant effects on crop emergence. Graph 4 shows the effect of depth of sowing on rate of crop emergence in a no-tillage situation. The plant establishment of the seed sown at 10mm and 25mm was significantly better than the seed sown at 0mm (surface) and 50mm.

Graph 4: Effect on Rate of emergence from different depths of sowing. Sown 12/11/04 by cross-slot drill (Manawatu).

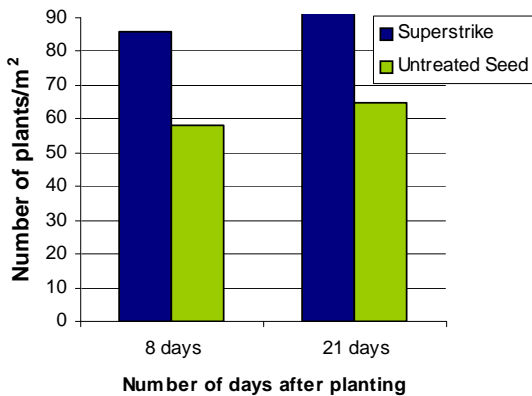


Sowing depth trial Aorangi Research Centre

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 ULTRASTRIKE™ is a registered trademark of Wrightson Limited
 Gaucho® is a registered trademark of Bayer

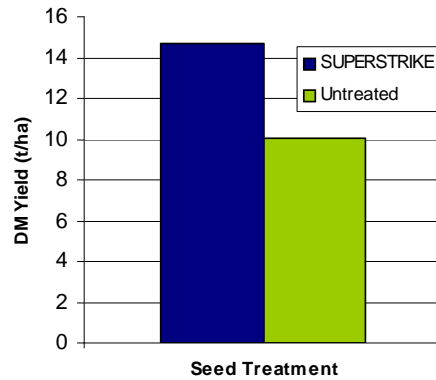
Agronomic benefits offered by treated seed

Comparison of Plant Establishment (Gruner Kale) SUPERSTRIKE vs Untreated Seed



Gruner kale plants per metre square 8 and 21 days after sowing at Gore, (Crop & Food Research) treated with SUPERSTRIKE® versus untreated seed.

Comparison of Dry Matter Production (Gruner Kale) SUPERSTRIKE® vs Untreated Seed



Dry matter yield production (t/ha 207 days after sowing) at Gore, (Crop & Food Research) from Gruner kale treated with SUPERSTRIKE® versus untreated seed.

Summary

Establishment (first 4-6 weeks post sowing) is when brassica crops are most vulnerable to factors that can cause a crop to fail or reduce its performance. Seed treatments protect crops from insect pests and fungal pathogens during establishment. Some seed treatments contain trace element nutrients to protect seedlings against nutrient disorders.

Seed treatments do not have a negative effect on the rate of brassica seedling emergence under dryland conditions. There are however a number of factors related to soils, seedbed conditions and sowing depth that have significant effects on crop establishment.

Seed treatments offer highly targeted, environmentally friendly, cost effective protection in a critical period in the life of a productive and profitable brassica crop.

Brassica Seed Treatment Options from PGG Wrightson Seeds

SUPERSTRIKE® **ULTRASTRIKE®**

