

Penergetic New Zealand - Broccoli & Leaf beet Trials: 2022 - 2023

This is a report on plant-growth trials of broccoli and leaf beet conducted on behalf of Penergetic New Zealand Limited by Dr Charles N Merfield (HND Comm. Hort., M.Appl.Sci. Hons, PhD, MRSNZ) of The BHU Future Farming Centre - Permanent Agriculture and Horticulture Science and Extension www.bhu.org.nz/future-farming-centre

Introduction

This report presents the results of two field experiments that trialled Penergetic-b Soil and Penergetic-p Plant products on broccoli and leaf beet crops. The trial objectives were to assess if the use of Penergetic-b Soil and Penergetic-p Plant has an impact on crop yield versus control plots.

The Company

Penergetic International AG, based in Switzerland, formulates and manufactures a wide range of agricultural products using proprietary biostimulation technology - utilising frequencies from selected natural substances to 'inform' carrier materials making up the final products. Penergetic organic certified products are distributed to around 40 countries around the world.

Trial Method and Design

The trials were based at the BHU Organics Trust, Lincoln University. The BHU are a certified organic property (by Organic Farm NZ), enabling the trials to be managed in accordance with organic regulations.

The broccoli trial ran from early Spring in August 2022 to February 2023; the leaf beet trial ran from September 2022 to March 2023.

A randomised complete block (RCB) design was used with six replicates and two treatments, 1) a null control and 2) Penergetic treatments including Penergetic-b Soil and Penergetic-p Plant (Vegetable variant).

		Pasture	Broccoli	Pasture	Broccoli	Pasture
Rep 1	5m		Penergetic		Control	
Buffer	2m					
Rep 2	5m		Control		Penergetic	
Buffer	2m					
Rep 3	5m		Penergetic		Control	
Buffer	2m					

Rep 4	5m		Control		Penergetic	
Buffer	2m					
Rep 5	5m		Control		Penergetic	
Buffer	2m					
Rep 6	5m		Penergetic		Control	
Pasture			1.7m	5m	1.7m	

Total length 40 m

Total width 8.4m

The Broccoli and Leaf beet Trials: used the vegetable bed system on 1.70 m wheel centres, giving a bed top of 1.40 m. The plots consisted of two 40 m long beds, with each plot being 5 m long, with a two -meter grassed buffer between plots. There was an additional untreated bed between the two 40 m beds that was grassed, to also act as a buffer – the buffer space minimised the effect of the Penergetic products spreading through the soil. To ensure treatment plots had the same vegetation on all sides, two more beds were cultivated on the outsides of the trial beds and also grassed.

The process used in the plot preparation and the application of Penergetic b Soil treatment allowed 30 days between application of the Penergetic-b Soil product and the first Penergetic-p Plant product. Penergetic-b was mixed with a commercially available seed sowing mixture for the plants in the Penergetic treatment plots. The same number of seed trays were filled with untreated commercial seed sowing mixture. All trays were then sown with new commercially available seed. The seedlings were placed in the BHU twin-skinned, unheated propagation tunnel. They were watered with the automatic overhead sprinkler system until the three to four leaf growth stage.

The Penergetic Soil product was applied at 3 kg/ha, and at designated growth stages the seedlings were manually treated with 2 applications Penergetic-p at the rate of 200g/ha, one before and one after transplantation.

At seedling stage, the seedlings were transplanted with control plots planted first then Penergetic plots to minimise cross-contamination. Each 5 × 1.4 m plot bed top was marked out with four rows 30 cm apart, with 50 cm spacing down the row, planted on diagonals to give a square planting pattern / equidistant spacing. This gave a total of 42 plants per plot. To avoid edge effects, and to further increase treatment separation, only 17 plants from the centre two rows were used for measurements, and the first and last plants at the ends of the plots were also excluded. The total number of heads and combined weight of heads per plot was recorded (the leaf beet recording was slightly different and detailed below).

Trial Yield Results for Penergetic vs Control

Broccoli + 19%: The broccoli grew well, despite the loss of some plants to rabbits after the mesh crop cover was removed and the protective fence installed the following day. There was some growth of twitch grass (*Elymus repens*) into the plots from the pasture, but the broccoli out competed it. Broccoli head grown on the Penergetic plots yielded 19% higher than the control plots. Based on the actual number of heads harvested and the total head weight on a per plot basis the average head weight for the control was 244 g and for Protector treatments it was 290 g representing a 19% increase in weight per head for the Penergetic treatment ($p=0.251$, $LSD^{5\%}=91.7$).



Broccoli trial: Photos taken on 16th January 2023 one day prior to harvesting. **Penergetic plot on left**, control on right.

Leaf beet + 21%: There was a considerable increase in the leaf beet crop yield of 21% in the Penergetic treated plants compared with the control. Due to rabbit damage to the plots closest to the fence line, only five replicates were used for analysis. Also, due to a few plants dying in the plots the maximum number of plants per plot were harvested and that number recorded. The total harvest weight per plot was then measured. Then the mean plant weight per plot was calculated and that was used for analysis. The average plant weight across all plots for the control was 0.38 kg and the Penergetic treatment was 0.46 kg representing a yield gain of 21% ($p=0.764$, $LSD^{5\%}=0.707$).



Leaf beet trial: prior to harvesting. **Penergetic treated plot on the left**, Control on the right.

Company and Product Summary:

Penergetic International AG, based in Switzerland, formulates and manufactures a wide range of agricultural products using proprietary biostimulation technology - utilising frequencies from selected natural substances to 'inform' carrier materials making up the final products. Penergetic organic certified products are distributed globally to 40 countries. Penergetic NZ are the Distributors of the Penergetic range of Products in New Zealand. Following is a brief description of the products used in this trial.

Penergetic-b Soil uses biostimulation processes to boost soil activity. The sustainable product promotes humus formation and supports soil life. Activating soil life results in a change in the soil structure and soil compaction is reduced in the long term. Improved root growth helps optimize availability of nutrients in the soil for the plants.

Penergetic-p Plant is used as a plant tonic and as described by Penergetic has a stabilizing effect on plant growth and strengthens the immune system of plants. This reduces susceptibility to diseases and pest infestation. An additional benefit is the stimulation on microbiology in the root area and increase of the plant's natural nutrient uptake. Plants become more resistant and through that a better productivity. Penergetic-p and b products are designed to be used together, according to application/dosage instructions, and when used accordingly the effect of both Penergetic-b & Penergetic-p is optimised.