

Overview

- Kale (*Brassica oleracea* L. subsp. *acephala*) is valued for its health promotion nutrients, which can be influenced by genotypic, environmental and production factors.^{1,2}
- The use of organic and natural growing medium amendments is not new to growers. Various organic and/or natural growing medium amendments are available for both field and greenhouse crop production. These amendments add organic matter, plant growth factors and nutrients.^{3,4}
- The year-round controlled environment and containerized production is becoming a popular demand for high-value produce including kale. The type of amendment (i.e. organic or natural) can impact on crop productivity and quality. This study compared the tissue mineral nutrient contents of kale 'Ripbor' in a growing medium adjusted with different amendments.



Materials and Methods

Experimental Setup

Pot experiment was conducted between August and December 2015 in the department greenhouse. The conditions were mean temperatures 24/16°C day/night with 71% RH and supplemental lighting from high-pressure sodium lamp at 12-hour day length cycle. Organically certified kale cv. Ripbor seedlings were raised on peat moss in a 36-cell plastic tray. Two seedlings were transplanted 3 weeks after germination into 10-inch (25.4cm) diameter pots filled with 1 kg of moistened Pro-mix BX™ soilless amended potting medium and later, thinned to 1 seedling/pot after 1 week of establishment.

Experimental Set up

The amendment rates based on manufacturers' recommendation for the 10-inch (25.4 cm) diameter pot were K-humate 47.5 g/pot; dry vermicasts 50 g/pot and volcanic minerals 100 g/pot. Treatments were arranged in a completely randomized design with 10 replications. The pots were re-arranged weekly to offset any unpredictable occurrence due to variations in environment.

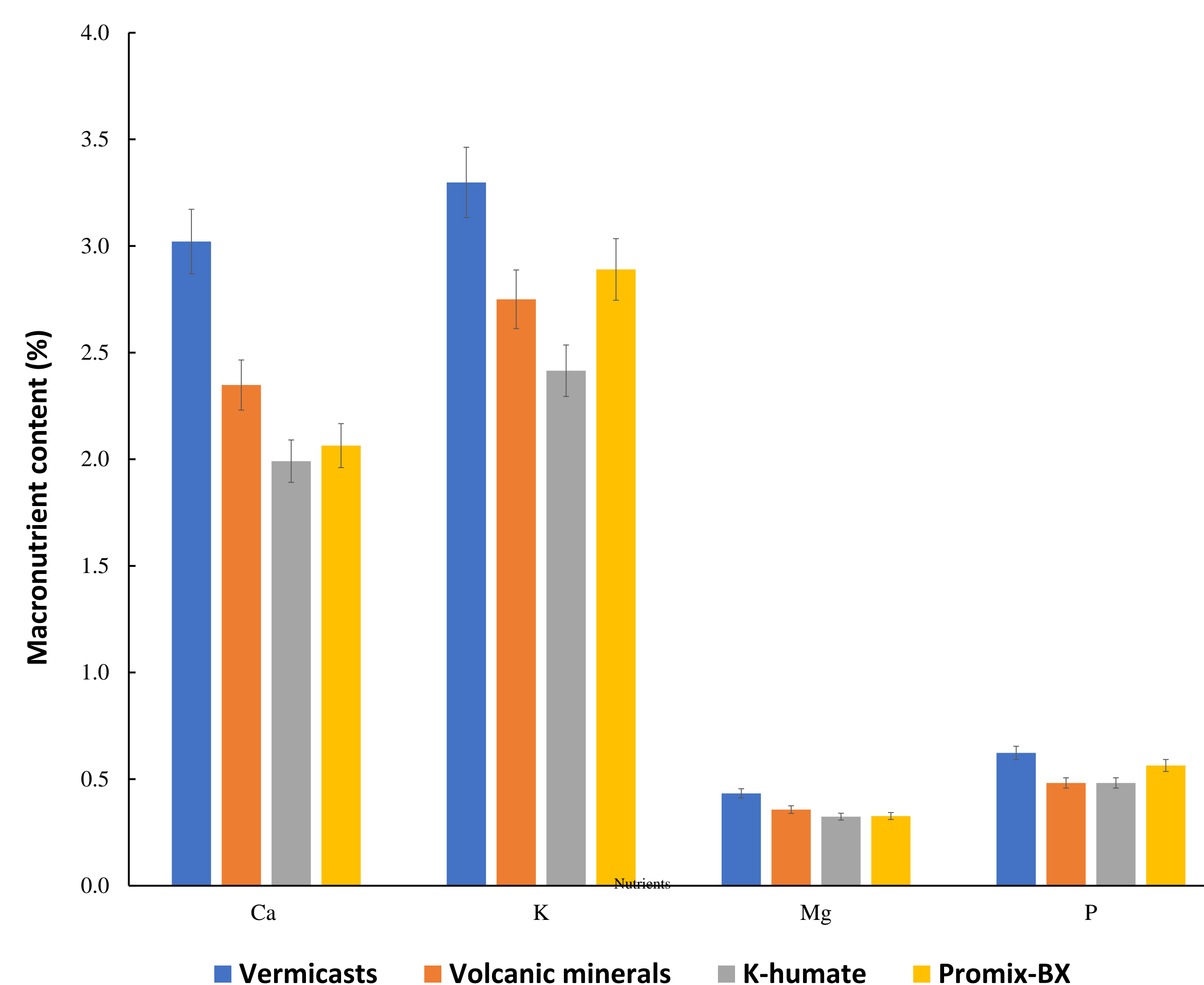
Plant Tissue Analysis

Edible leaves were harvested at 50 days after planting and consisted of leaf blades attached to petiole with <5% blemishes. The leaves were dried in a mechanical convection oven dryer (Cole-Palmer Instrumental Co, Vernon Hills, Ill.) at 65°C for 48 hours. 450 g samples of dried edible leaf tissues were sent to the Nova Scotia Department of Agriculture laboratory services for the analysis of selected mineral nutrients.

Results and Discussion

- The tissue mineral contents varied significantly among the amendments. Dry vermicast yielded the highest amounts of Ca and K which were 33 and 19%, respectively, higher than the Pro-mix BX™ control (Fig. 1). The K humate produced the lowest amounts of Ca, K, Mg and P. The K level was 20% lower than the Pro-mix BX™ control

Fig. 1. Selected macronutrients content of kale in amended growing medium

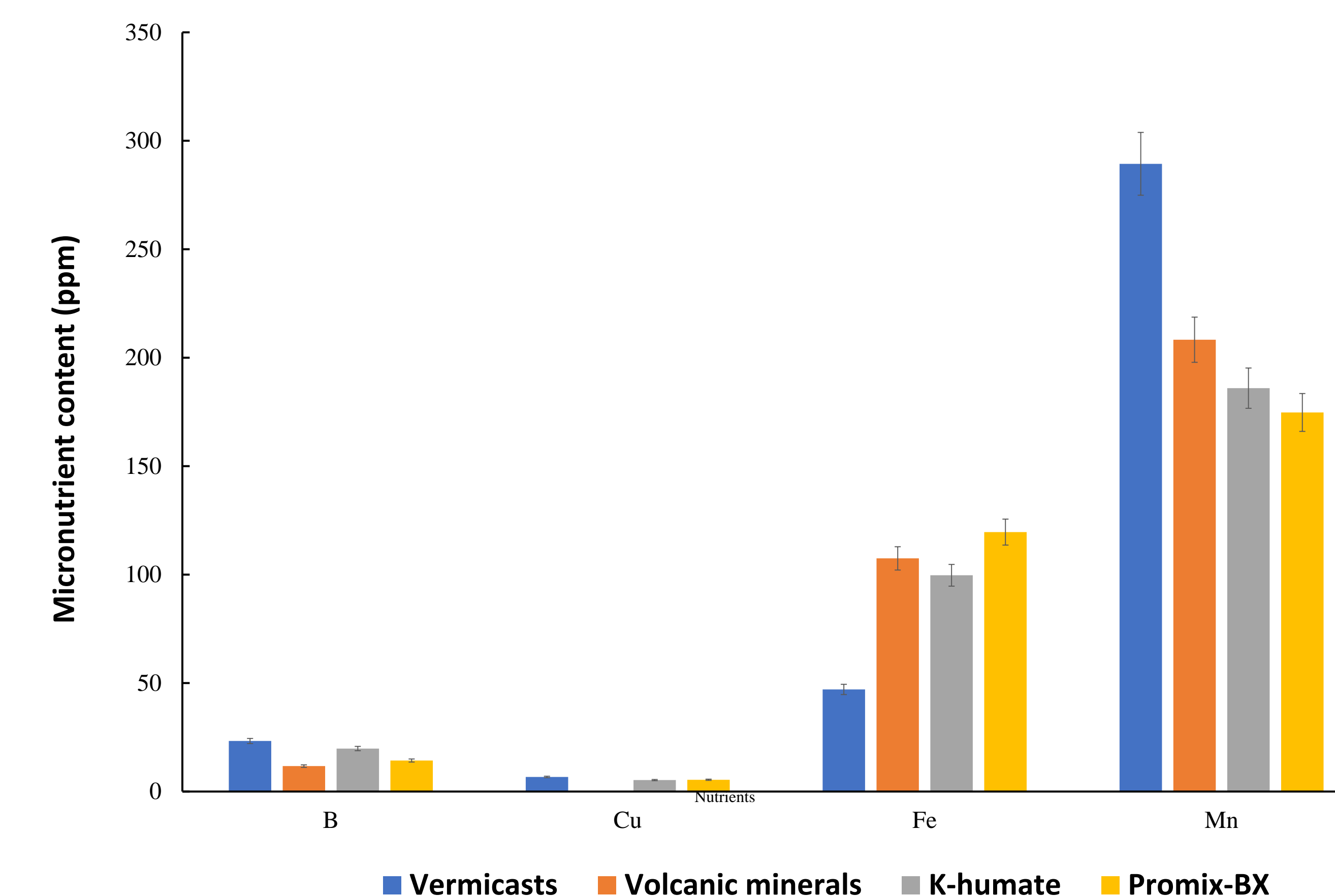


- The dry vermicast had the highest tissue Mn and was 30% more than the control Pro-mix BX™ (Fig. 2). The tissue Fe level was lowest for the dry vermicasts, and was 45% lower than the control Pro-mix BX™. This was surprising since the pH was in the range for iron availability in the medium.
- The dry vermicasts, volcanic mineral, K-humate and the Pro-mix BX™ had pH of 5.7, 7.9, 3.2 and 5.4, respectively. All except K-humate were within the acceptable limits for most plants. The low pH of K-humate could be a factor in the low levels of Ca and K. Therefore it may be necessary to adjust the pH of the growing medium, when K-humate is used as an amendment for growing kale.
- Overall kale tissue nutrient contents Ca, K, Mg, P, Mn and B were improved by the dry vermicasts and volcanic mineral amendments as compared to the . Pro-mix BX™ .
- The very low tissue content of Cu suggests that the amendments and the growing medium may contain only trace amounts of the micronutrient.

Results and Discussion

- The Pro-mix BX™ had sufficient nutrients for plant growth as a pre-mixed general purpose soilless medium. Future study could consider less nutrient dense medium for comparison.

Fig. 2. Selected micronutrients content of kale in amended growing medium



Conclusion

- The amendments enhanced the Pro-mix BX™ growing medium for kale production in controlled environment.
- The amendment type can define the mineral content of kale.
- The dry vermicasts boosted the Ca and K contents of kale plants compared to the volcanic minerals and K-humate treatments.

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