



# Impact of High Glucosinolate Mustard Soil Amendments on Black Bean Yield 2014



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2014

16.7 lbs. of viable seed per acre respectively. The HGM Caliente varieties ‘119’ and ‘199’, blended 50/50 were, cold-pressed with a KK40 oilseed press on 29-Oct 2013 (Figure 1). The meal was hammer-milled immediately after extrusion to achieve a fine texture. Meal was applied in the ‘fall-applied meal’ treatment on 5-Nov 2013 at a rate of 2.4 lbs. per plot, or 522 lbs. per acre. On 5-Nov 2013, biomass samples of the HGM cover crop plots were taken by harvesting all plants in a known area. Subsamples were dried and collected, then shipped to Cumberland Valley Analytics in Hagerstown, MD for determination of nitrogen concentrations in the in HGM. The HGM whole plant plots were chopped with a rear-mounted brush hog on 5-Nov 2013 and all plots were disc harrowed to incorporate and prepare the seedbed. Soil samples were taken by treatment just prior to HGM incorporation and were processed by UVM’s Agricultural and Environmental Testing Laboratory.

**Table 1. Agronomic management of HGM and black bean trial, 2013-2014, Alburgh, VT.**

<b>Location</b>	<b>Borderview Research Farm – Alburgh, VT</b>
<b>Soil type</b>	Covington silt clay loam
<b>Previous crop</b>	Sunflower
<b>HGM treatments</b>	Whole plant, fall-applied meal, spring-applied meal, control
<b>Replications</b>	3
<b>Plot size (ft)</b>	10 x 20
<b>HGM planting date</b>	19-Aug 2013
<b>HGM seeding rate (lbs ac<sup>-1</sup>)</b>	25 (119 & 199), 16.7 (61)
<b>HGM termination</b>	5-Nov 2013
<b>Fall HGM meal application date</b>	5-Nov 2013
<b>Fall HGM meal rate (lbs ac<sup>-1</sup>)</b>	522
<b>Spring HGM meal application date</b>	12-May 2014
<b>Spring HGM meal rate (lbs ac<sup>-1</sup>)</b>	522
<b>Black bean variety</b>	Midnight black turtle
<b>Black bean planting date</b>	2-Jun 2014
<b>Black bean planting rate (seeds ft<sup>-1</sup>)</b>	8-10
<b>Weed control</b>	Cultivated 23-Jun, 3-Jul; hand weeded 16-Jun
<b>Harvest date</b>	20-Oct 2014

In the spring of 2014, all plots were soil sampled to a depth of 12 inches. On 2-May 2014, HGM Caliente varieties ‘119’ and ‘199’ blended 50/50 were cold-pressed with a KK40 oilseed press, and the meal was hammer-milled. Meal was applied to the ‘spring-applied meal’ treatment on 12-May 2014 at a rate of 2.4 lbs. per plot, or 522 lbs. per acre. Plots were disked to incorporate meal on 19-May and the soil prepped for planting again on 29-May.

Black turtle beans (the variety 'Midnight') were planted on 2-Jun 2014 with a John Deere MaxEmerge 1750 corn planter. Beans were seeded in 30" rows at a rate of 8-10 seeds per row foot, or approximately 130,000 seeds per acre. On 16-Jun 2014, bean plants had emerged, and plots were hand-

2.0. This means that these treatments did not differ in the evaluated variable. The difference between C and A is equal to 3.0, which is greater than the LSD value of 2.0. This means that the values evaluated variable of these treatments were significantly different from one another. The asterisk indicates that treatment B was not significantly lower than the top performing treatment C, indicated in bold.

## **RESULTS**

Weather data was collected with an onsite Davis Instruments Vantage Pro2 weather station equipped with a WeatherLink data logger.

**Table 3. HGM cover crop biomass samples collected 5-Nov 2013, Alburgh, VT.**

HGM Variety	Moisture %	Dry matter yield lbs. ac <sup>-1</sup>
199	83.4	1374
61	83.3	1680
119	82.8	2395
Mean	82.3	1816

Soil nutrient content was assessed in late fall 2013

Soil nutrient content was again assessed, this time for all plots, in the spring 2014. This was done prior to the spring meal applications so at this point in time the spring meal and control treatments have experienced the same conditions. Soil pH, Mg, Ca, and CEC varied statistically across HGM treatments (Table 6). Magnesium was highest in the whole plant variety 61 treatment at 99 ppm. This differed statistically from the fall and spring meals as well as whole plant variety 119. Calcium was also the highest in the whole plant varieties 61 and 199. The CEC was also the highest in the 61 and 199 varieties at 39.2 and 29.3 meq 100g<sup>-1</sup> respectively. Organic matter, zinc, potassium, and phosphorous did not differ across treatments. Interestingly, the varieties that produced greater changes in soil nutrients and quality, varieties 61 and 199, were not as high yielding as variety 119 which had consistently lower soil nutrients.

**Table 6. Soil nutrient analysis for HGM treatments, 25-Apr 2014, Alburgh, VT.**

HGM treatment	Soil pH	Available P	K	Mg	Al	Ca	Zn	CEC	Organic matter
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**Figure 3**

## **DISCUSSION**