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Research Reports

The Feasibility of Organic Nutrient Management in Large-scale Sweet Corn Production for Processing

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Summary. **There is significant interest from vegetable processors, growers, and consumers in organic sweet corn (*Zea mays*) production. Organic nitrogen (N) management is particularly challenging in high N consuming crops such as sweet corn because of the low N content and low N to phosphorus (P) ratios of organic soil amendments. Various management programs were compared to determine the optimal combination of soil amendments and green manure crops for organic sweet corn production. Alfalfa (*Medicago sativa*), rye (*Secale cereale*), and field pea (*Pisum sativum*) were used as green manure crops. Composted poultry manure and a high N content organic fertilizer were used as organic amendments. Ammonium nitrate was used in a conventional management program for comparison. Treatments were designed to deliver a full rate of N (150 lb/acre), a half rate of N (75 lb/acre), and to limit the amount of P applied. Phosphorus can become a source of pollution when applied to erodible soils, particularly when soils already contain excessive P. Sweet corn yield in many of the organic programs was highly variable among years while the yield was more consistent in the conventional program. This was attributed to differences in organic N mineralization in both the green manure crops and the amendments. The most stable yield from an organic treatment, among years, was achieved using the commercially available organic N fertilizer. Commercially available amendments were costly, and although organic sweet corn received a premium price in years when organic yields were lower, profit was reduced by the high cost of N management.**

Vegetable processors in Wisconsin have expressed interest in producing organic sweet corn. The organic food market has increased in value from $1 billion in 1990 to $26.6 billion in 2010 (Organic Trade Association, 2010). Organic vegetable production would provide a new market for Wisconsin vegetable growers and processors. Furthermore, consumers currently pay a premium price for organically produced food (Oberholtzer et al., 2005), providing an additional incentive. Large volumes of raw vegetables are needed to designate facilities for organic processing in accordance with U.S. Department of Agriculture National Organic Program rules (USDA, 2007). Therefore, management practices for organic processing vegetables must be practical on a large scale.

Nitrogen management in large-scale production is a challenge to growers, particularly for crops such as sweet corn that require large amounts of N for optimal production (150 lb/acre) (Laboski et al., 2006). Nitrogen can be a costly input for organic growers because of the low N content of many organic fertilizers. Thus, a diversified approach to N management may be a cost effective means of producing sweet corn organically. Animal manure, compost, green manure (GrM) crops, and commercially available soil amendments can be used to meet crop nutrient needs in organic systems (Gaskell and Smith, 2007).

Manure is an important amendment for use in organic production systems. Its relative abundance and role as a waste product make it an inexpensive fertilizer amendment. Manure must be composted before use in organic vegetable production systems because of organic program regulations on using raw manures (USDA, 2007) and to improve the stability of the organic compounds in the manure (Gaskell and Smith, 2007). Composted manure generally contains a low N concentration and a low N to P ratio. Using manure as a sole N source for sweet corn production may cause several complications for the grower. Large quantities must be applied, because of the low N content, creating added expense when transportation and application costs are factored into the overall cost of the amendment (Gaskell and Smith, 2007). Also, application of

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Units

To convert U.S. to SI, multiply by	U.S. unit	SI unit	To convert SI to U.S., multiply by
0.4047	acre(s)	ha	2.4711
29,574	fl oz	μL	3.3814×10^{-5}
29.5735	fl oz	mL	0.0338
0.3048	ft	m	3.2808
2.54	inch(es)	cm	0.3937
25.4	inch(es)	mm	0.0394
0.4536	lb	kg	2.2046
1.1209	lb/acre	$kg \cdot ha^{-1}$	0.8922
1	ppm	$mg \cdot kg^{-1}$	1
2.2417	ton/acre	$Mg \cdot ha^{-1}$	0.4461
(°F – 32) ÷ 1.8	°F	°C	(1.8 × °C) + 32