Assessing the Suitability of Black Soldier Fly Castings Produced from Piggery Waste as a Fertilizer

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Black Soldier Fly (*Hermetia illucens*, BSF) farming provides an alternative waste management solution on piggeries by utilising manure to produce a high protein insect meal, whilst the fly castings (frass) are a valuable fertiliser. However, the BSF frass cannot be developed further in Australia as a fertiliser until the agronomic and economic value of this product is fully evaluated. The objective was to quantify the agronomic benefit of frass derived from piggery manure as an alternative fertilizer for wheat production. It was hypothesised that the frass amendment would increase yield, nutrient content and soil fertility in comparison to other manure derived fertiliser products. Fresh and stockpiled manure and two graded composts were collected from a piggery in Gingin. Frass was generated from feeding pig manure to BSF larvae at Future Green Solutions. After 2-5 days the resulting BSF pupa was harvested leaving behind the frass residue. A pot experiment was established to compare crop productivity between soil amended with frass and soil amended with four manure products currently on the market (fresh and stockpiled manure, low and high grade composts). Control treatments included a zero fertiliser control, and an addition of synthetic fertiliser (NPS) at rates of 10, 25, 50, 75 and 100 kg ha^{-1}. District practice for this area and soil type is 100 kg NPS ha^{-1}. Wheat (*Triticum aestivum L*.) was grown in a randomized block design in four replicates. The pots were maintained at 80% water holding capacity. Seedlings were thinned to two per pot and grown to maturity before harvest at 118 days. Total shoot dry weights per pot for each treatment was then calculated. The BSF frass performed as well as synthetic fertiliser in terms of nutrient provision to wheat crops and yield ($P \leq 0.05$). In contrast, the total biomass of the plants receiving the conventional manure and compost products were a lot more variable with only the fresh manure treatment having a yield greater than the control. These data show that the use of frass derived from piggery manure as an alternative fertiliser significantly improved the overall wheat production when compared to the fresh, stockpiled or composed piggery manure. Adoption of BSF technology on piggeries has potential to increase productivity and profitability via reduced input costs and generation of high quality products from manure that provide additional revenue streams.