EXAMINATION OF THE ECONOMIC FEASIBILITY OF METHYL BROMIDE ALTERNATIVES

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Introduction

The cost effectiveness of alternatives to methyl bromide has not been adequately evaluated in the literature. Often the data is collected at different times of the year leading to difficulties in interpreting treatment cost and efficacy.

To address the difficulty in interpreting treatment data and to facilitate comparisons between methyl bromide and its alternatives, a three-year project was funded and initiated at Kansas State University in September 2008. This project will examine treatments in the same facility (Hall Ross pilot flour mill at Kansas State University) under similar environmental conditions and treatment practices. Treatments examined include methyl bromide (MB), sulfuryl fluoride (SF), and heat (HT). Efficacy will be examined using several life stages of the red flour beetle (eggs, young larvae, pupae, and adults) at two sanitation levels, dusting of flour and flour 2 cm high.

The objective of this presentation is to discuss the conceptual framework that will be used to compare the cost and treatment efficacy of MB, SF, and HT treatments.

Materials and Methods

The primary method used to compare the treatments will be partial budgeting. Partial budgeting involves answering the following four questions for each treatment alternative: what new or additional costs will be incurred, what current costs will be reduced or eliminated, what new or additional revenue will be received, and what current revenue will be lost or reduced? These questions will be addressed on the basis of what would happen if the proposed alternative (SF or HT) to methyl bromide was implemented. Additional costs are costs that do not exist at the current time with the current plan. Reduced revenue represents revenue currently received but which will be lost or reduced should the alternative be adopted. Additional revenue represents revenue to be received only if the

alternative is adopted. Reduced costs are costs now being incurred that would no longer exist under the alternative being considered. The partial budgeting framework will be illustrated using the *Methyl Bromide Critical Use Renomination for Post-Harvest Treatment of Structures, 2011*.

Costs for the treatments in this project will be computed using cost budgets and capital budgeting. Costs include the following: fumigants, monitoring devices, energy, labor, and equipment costs (lease costs; amortized purchase costs). Cost comparisons will focus on differences between treatments. It is also important to note that revenue from alternatives may be reduced if a portion of the product needs to be discarded due to the treatment or the plant needs to be shut down for a relatively longer time period due to the treatment. Conversely, revenue from the HT treatment may be higher if it is possible to obtain a higher product price due to the reduction in the use of fumigants associated with this treatment.

Other considerations that need to be considered are how an alternative treatment may impact a firm's competitive advantage, unique resources, and risk. Competitive advantage typically involves either focusing on cost control or product differentiation. If a treatment impacts a firm's competitive advantage or unique resources, these impacts will need to be incorporated into the partial budgeting framework. Risk is related to treatment efficacy, and cost and revenue estimates. Cost, revenue, and efficacy depend on many factors including labor costs, fumigant costs, and fuel prices. The optimal control strategy may change as these factors change. Sensitivity analysis will be used to examine the impact of cost and revenue estimates on the feasibility of the SF and HT treatments.

Expected Results and Discussion

Economic analysis of the MB, SF, and HT treatments conduced in the pilot mill will be summarized in extension and research papers. Also, the conceptual framework will be used to examine the feasibility of treatment alternatives in several commercial facilities. These results will also be summarized and published.

If data permits, analysis of the tradeoff between treatment cost and efficacy for sulfuryl fluoride and heat will also be summarized. This analysis requires data on different fumigation levels for the case of sulfuryl fluoride treatments and different fuel amounts for the heat treatments.