A MODEL OF THE RICE POSTHARVEST SYSTEM IN THE PHILIPPINES

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ABSTRACT

The Philippine government launched the Grains Production Enhancement Program (GPEP) in selected areas of the country most suited for grain production leaving the less productive areas for the production of commercial or cash crops. One of the projects under this program is the postharvest (PH) loss assessment which aims to obtain baseline estimates of loss of rice and corn grains from harvest until storage and compare these figures with losses estimated from researches conducted in the Philippines. In the future, periodic surveys will be done to assess the progress of postharvest technology in the country.

A model of a representative rice postharvest system was constructed using STELLA II simulation software. The objective of this modeling exercise was to understand some of the interacting factors contributing to quantitative grain loss (weight loss) after harvest.

Data for the model came from results of the field surveys in the Bicol region, Southern Luzon Island of the Philippines during the wet and dry seasons of 1995. Durations of each PH operation in days and weight losses were estimated as a function of grain moisture content and volume of stock entering the operation.

The model is sensitive to moisture content, volume stock entering each operation and shortage of manpower contributing to delays in the operations. Cumulative grain losses followed the typical sigmoid curves. Under similar conditions, simulation results were close to field and research data.

INTRODUCTION

The Grains Production Enhancement Program (GPEP), recently re-named Gintong Ani (Golden Harvest) is the latest of Philippine programs aimed at attaining self sufficiency in rice and corn. While the overall development program seeks to increase farm income and transform subsistence farmers into entrepreneurs, GPEP envisions to empower farmer cooperatives and establish an efficient handling and marketing system profitably run and operated by cooperatives (NAPHIRE, 1995).

One of the support programs administered by the National Postharvest Institute for Research and Extension (NAPHIRE) of DA, is the Postharvest Loss Assessment Project which aims to identify and measure the quantitative and qualitative losses in rice and corn post -production systems, and in the process validate earlier estimates of losses derived from research which ranged from 10-37%. The project also aims to determine technical, social and economic factors affecting postharvest losses in rice and corn and establish a system of periodic monitoring of postharvest (NAPHIRE, 1995). The baseline survey conducted in 1995 generated so much data that it opened an opportunity to study the dynamics of postharvest grain flow and losses through systems analysis. For one the sequence and methods of PH operations (e.g. harvesting, threshing, piling, transporting, milling, etc.) differed from place to place.

MATERIALS AND METHODS

Benchmark Surveys:

The benchmark surveys were conducted in all GPEP provinces covering the wet and dry season crops. A multi-stage sampling design was followed: sample provinces, towns, villages, farmer cooperatives, and farmer respondents.

The surveys included time and motion studies of the different PH operations as affected by volume of harvest and number of farm labor or machine available.

Estimation of loss in post harvest operations:

Quantitative loss in a post harvest (PH) operation was defined as the difference between the input and the output of that operation often expressed as a proportion or percentage with respect to the input.

The first reports received at NAPHIRE came from the Bicol region, Southern part of Luzon island and served the basis for the parameters used in the model. The PH losses observed in the field were within the ranges found in earlier studies except for drying and milling losses which are questionably much higher than previously reported.

The model was constructed using STELLA II (Structure Thinking Experiential Learning Laboratory with Animation) High Performance System Software on the Apple Powerbook 520.

Results and Discussion

The figures show the results of simulations using different combinations of inputs. The present model is sensitive to volume of stock and number of persons doing the manual operations. Steeper curves of PH operations are to be

expected with smaller socks being processesed or more people doing the processing. The loss curves are not yet sensitive to duration of operation.

Validation of the model is being planned now that data from the other regions are available. Site-specific rates of operations, loss estimates and potential yields will be substituted to the ones estimated from the Bicol region as used in this exercise.

The model is a useful tool in demonstrating to all concerned with the grains industry the implications of postharvest losses. Farmers through cooperatives are now demanding for more PH facilities from the government. Reduction of the observed 7.32% drying loss even to 5% (highest rate obtained in research) could be significant considering that the hectarage of ricefield is shrinking due to land use conversion.

This model is a first attempt to describe the dynamics of the PH system before storage in the Philippines. It stands a lot of improvements at its present state. It can already be used to identify knowledge gaps regarding pH systems (e.g. what factors cause losses and now) and what interventions are needed to improve these systems and reduce losses.

Acknowledgement

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Postharvest teams. Postharvest loss assessment reports.

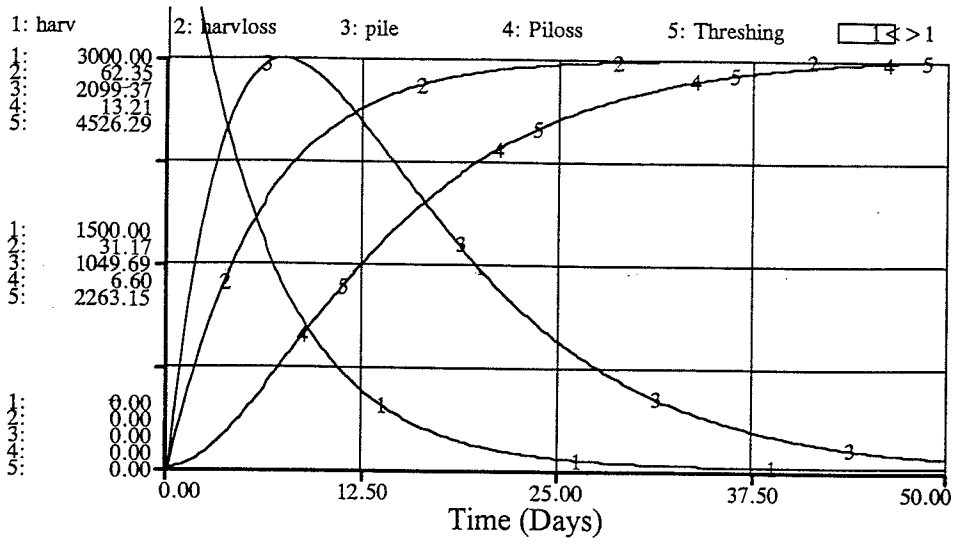

Fig. 1a . Graph of simulation of harvesting to threshing with only one person doing the operation in one hectare area with potential yield of 4653.75 kg and initial grain MC of 18%.

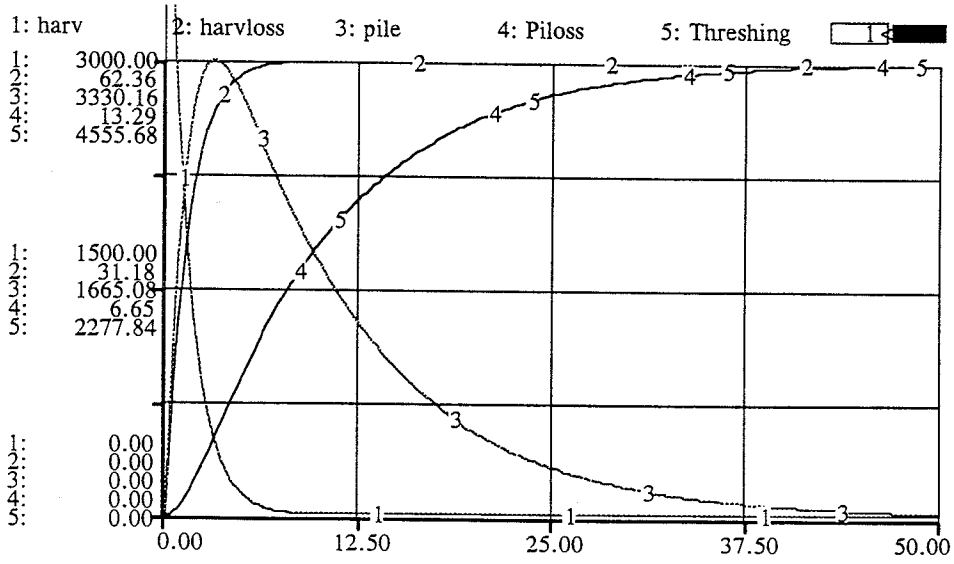

Fig. 1b. Graph of simulation of harvesting to threshing with four persons, all other factors the same as 1a.