Developing Budgets

GUAM COOPERATIVE EXTENSION *FARM MANAGEMENT & MARKETING PUBLICATION*

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In any business activity, agricultural or other types, one of the most effective methods of increasing profits and reducing the risk of failure is good planning. A key planning tool for farmers is a crop budget. In many states, the Cooperative Extension Service provides budgets for a wide variety of agricultural enterprises. A budget is usually based on the records of top growers in the state. Such a budget can serve both as a guide to recommended production practices and serve as an estimator of production costs and profits. This tool is especially important for growers that are new to farming. But, for any grower, the most important budget to use in planning is the one that comes from the grower's own past records. The purpose of this section is to provide growers with the information and tools necessary to develop their own budgets.

To be useful, budgets must take into account the agricultural practices and yields of the area where they will be used. Frequently, budgets from the U.S. mainland are not directly transferable to tropical island settings, due to differences in scale and production practices. Budgets from the U.S. mainland are designed for large farms with acres as the unit of production. On Guam, it is normal for growers to have plantings that are less than one acre. A standard unit for reporting crop production adopted by the College of Agriculture and Life Sciences, University of Guam is a 100 foot row.

Crop budgets can take many forms. The budget may be just a simple list of expected out-of-pocket costs for the crop or it may involve a detailed breakdown of how each farm expense is allocated to a given planting. Growers, in developing a budget, will benefit from an increased understanding of their costs regardless of the degree of detail and effort put into preparing the budget. The three major components of a crop budget are

1. Estimated costs of the various inputs and activities involved in the production and marketing of the crop.
2. Estimated marketable quantity of crop expected to be harvested.
3. The estimated selling price for the crop.

Given these components a grower can calculate the expected net return and the expected breakeven price.

Estimating Costs

When examining production costs, growers need to understand that there are two different types of costs involved in their farming operations, variable costs and fixed costs. Many of the variable and fixed costs are for expenses that are shared by multiple crops or enterprises on the farm. These costs are known as whole farm costs, of which only a portion should be charged to a single planting.

Variable Costs

Variable costs are costs that can change during the production cycle. They are directly related to increases or decreases in production. Examples of variable costs are labor, seeds, fertilizer, and packaging materials. When making decisions on which crop to produce and how much to produce, the most important considerations are variable costs, expected yield, and market price. In the short run, the fixed costs will be the same no matter what the grower decides to do.

For many farmers, budgeting is a new concept and frequently all the desired financial records are not available. Receipts are the beginning of a budget; therefore they must be recorded and filed. To identify the cost of production in cases where records are missing, it is important to structure the budgeting process in a manner that is familiar to the grower (Table 14). Before the various components of the table are discussed it is necessary to point out that this is only a starting point in identifying variable costs because such a list will change with management practices and equipment.

Labor (the farmer's own or hired) is a primary input in the production process. It is also the input that the farmer can most easily document or recall. The production process should first be divided into logical identifiable stages (field preparation, grow out, and harvest and marketing). The practices occurring during each stage need to be identified. One can then determine the labor and inputs of materials and supplies for the practices at the various stages. The man-hours required during each stage will determine the labor component in the budget.

The worksheet (Table 14) will provide reference points for the farmer to use in identifying the purchased inputs (materials and supplies) necessary for the production process. At a minimum, farmers must be able to cover their variable costs. If they cannot, then they may need to switch crops, change farm practices, or pull out of the market.

Fixed Costs

Fixed costs are the expenses that remain the same, during the production period, for any level of production. Examples of fixed costs are land, equipment, and insurance. Many fixed costs are more difficult to calculate than variable costs because some are spread over many production cycles or years. For example the cost of a tractor must be spread or depreciated over many years.

Another consideration in estimating costs is that most fixed and several

variable costs are *Whole Farm* in nature. For growers that produce different crops, costs like tractor fuel and tractor repairs, which are variable costs, or property taxes and rent payments, which are fixed costs, must be allocated among the different crops.

Some fixed costs, such as property tax or rent, are easier to calculate than others because the cost is a set annual amount. Many others, like the cost of a tractor or chilling unit, are a little more difficult to estimate. This is because the costs are spread (depreciated) over several production periods. A major annual cost to the farm for such items is the loss in value that results from each year of use (the item's depreciation) (Table 15).

Table 14. Worksheet for use in calculating the variable cost portion of a single crop budget.

Practices	Input of Labor			Input of Materials and Supplies				
	Man hours	Wage/Rate	Cost	Item	Unit (example)	Number	Price/Unit	Cost
Field Preparation Stage								
Mowing				Fuel	gal			
Plowing				Fuel	gal			
Disk/Till				Fuel	gal			
Preplant Fertilization				Fertilizer	(50 lb bags)			
Install Irrigation				Drip Lines	(100 ft)			
Other				Other				
Other				Other				
Grow Out Stage								
Plant Seeds				Seeds	lbs			
Transplant				Transplants	flat			
Insect Control				Insecticide	oz			
Disease Control				Fungicide	oz			
Mechanical Weed Control				Other				
Chemical Weed Control				Herbicide	oz			
Slug Control Pellets				Pellets	lbs/box			
Install Trellis				Poles				
				Net	(100 ft)			
				Rope/Wire	(100 ft)			
Side-dress application				Fertilizer	(50 lbs bags)			
Other				Other				
Other				Other				
Harvest and Marketing Stages								
Picking				Crates				
Washing				Other				
Sorting/Packing				Boxes				
Chilling & Storage				Electricity	kw/hour			
Delivery & Sales				Fuel	gal			
Other				Other				
Total Labor Cost:				**Total Materials/Supplies Cost:**				

Table 15. Calculation of annual depreciation cost (**AC**) for three items.

Item	Cost **C**	Salvage Value **SV**	Estimated Life (Years) **L**	Annual Depreciation Cost **AC***
Tractor	$25,000	$1,000	10	$2,400
Chilling Unit	$5,000	$500	5	$900
Delivery Truck	$14,000	$2,000	6	$2,000

* AC = (C - SV) ÷ L

To use this simple method (Table 15) to calculate the annual depreciation cost (**AC**), one needs to know the cost (**C**) of the item, the estimated life (**L**) in years, and its salvage value (**SV**). The salvage value is the amount of money you could receive for the item if you were to sell it after **L** years. An example of annual depreciation cost (**AC**) is shown below:

$$AC = \frac{C - SV}{L}$$

Example: Tractor $AC = \frac{\$25{,}000 - \$1{,}000}{10} = \$2{,}400$

Allocating Whole Farm Costs to Individual Plantings

Whole farm costs are those costs that cannot be directly charged to a single planting of a crop or agricultural enterprise. Whole farm costs can be either fixed or variable costs. These costs should be distributed among the farm's different agricultural crops. Calculating the distribution of these costs involves looking at cost of an input (equipment, land, etc.) from a whole farm perspective (Table 16), as opposed to using only a single variable cost approach (Table 14). The steps used in deciding how much of each annual depreciation cost to charge to a single planting and how to calculate whole farm costs are as follows:

1. Determine the farm production unit. On Guam, most farmers would use the 100 foot row as their production unit.
2. Estimate the total number of production units (**TU**) for all crops during the year which are dependent on a particular item. For example, the tractor and truck are used for all crops (2,240 units) but the chilling unit is only used for some of the crops (1,000 units).
3. Identify the annual depreciation cost (**AC**) of an item (tractor, chilling unit, or delivery truck).
4. The farm production unit cost (**UC**) is equal to the annual depreciation cost (**AC**) of the item divided by the total production units (**TU**).
5. Determine the number of units in a single planting under consideration (**NU**).
6. Calculate the planting cost (**PC**) by multiplying the number of units in the single planting (**NU**) by the production unit cost (**UC**).

Variable costs, such as fuel for a tractor, maintenance, or electricity, are whole farm costs. This method can also be used in determining how to allocate these whole farm costs. When using variable costs, the term (**AC**) is defined as annual costs and not annual depreciation cost. Once all the costs associated with a planting have been determined the marketable harvest and selling price must be identified to determine the profitability of the crop.

Estimating Quantity to be Harvested

Harvest or yield estimates in the US mainland are usually based on a given area such as acres. For island farmers, a harvest estimation based on the average per plant yield times the number of plants in a planting is more useful due to their small planting size, widely varied production systems, equipment, management skills, terrain, row and plant spacing.

For the island farmer, the first step in estimating harvest (**H**) is to determine the number of plants in a planting unit (**P**). To calculate the number of plants in a planting the grower needs three measurements and the following formula:

$$P = \frac{R \times L}{D}$$

R = the number of rows
L = the row length in feet
D = the distance, in feet, between plants in a row

Table 16. Allocating a portion of yearly whole farm costs to a single planting.

Item*	Annual Depreciation Cost **AC****	Total Production Units in a Year **TU**	Production Unit Cost **UC*****	Number of Units in Single Planting **NU**	Planting Cost **PC********
Tractor	$2,400	2,240	$1.07	40	$42.80
Chilling Unit	$900	1,000	$0.90	40	$36.00
Delivery Truck	$2,000	2,240	$0.89	40	$35.60

* Items that are used in the production of this single crop planting.
** Since we do not depreciate variable items,
AC = annual cost when variable items are used.
*** **UC** = **AC** ÷ **TU**
**** **PC** = **UC** x **NU**

*For example, a grower plants 10 rows of cucumbers (**R**), each row is 100 feet long (**L**), and the distance between plants in a row is 1 foot (**D**). You multiply 10 rows by 100 ft. to give you 1,000 row feet. This would then be divided by the 1 foot to equal 1,000 plants in the planting (**P**).*

$$P = \frac{10 \times 100}{1} = 1{,}000 \text{ plants}$$

The next step in calculating a grower's estimated harvest (**H**) requires an estimate of the expected yield per plant (**Y**). While both the Guam Department of Agriculture and the Guam Cooperative Extension have estimates of average plant yields for many crops grown on Guam, the best estimate to use is one based on the grower's past experiences. To calculate (**Y**), a grower records the total pounds harvested (**T**) for a planting and then divides by the number of plants in the planting (**P**). See formula below:

$$Y = \frac{T}{P}$$

Y = yield per plant
T = total pounds harvested
P = number of plants

Keeping the average plant yield for several crop cycles will allow a grower to calculate an average yield per plant for the farm.
To estimate harvest for a planting (**H**), multiply the farm's average plant yield (**Y**) times the number of plants (**P**) in the proposed planting. In estimating the harvest a grower might want to consider previous production history and use both a high and low estimate.

$$H = Y \times P$$

H = estimated harvest
Y = farm's average plant yield
P = number of plants in proposed planting

Estimating Your Selling Price

The price a grower is able to obtain for his product depends on many variables, such as product quality, supply of the product on the market, and the grower's ability to negotiate. Many growers remember the prices they have historically obtained for their crops. The Guam Department of Agriculture together with the Guam Cooperative Extension collected farmer selling prices on a monthly basis during the years of 1994, 1995 and 1996. This information is available from the Guam Cooperative Extension. The Guam Department of Agriculture maintains a list of buyers for many crops and in some cases the prices these buyers are willing to pay. It must be noted that historical prices should only serve as a guide and do not ensure present or future prices. Other growers and potential buyers are excellent sources of current information for the market price.

Frequently in order to make a sale, it is important to look at information other than just the market price. If there are large amounts of the crop in the market channels or if a grower is new to the market or trying to capture a larger portion of the market share, it may be necessary to sell below the market price. In order to determine if it is possible to lower one's selling price without suffering losses it is important to know one's breakeven price.

Breakeven Price

Once a grower has calculated the cost of production for a planting an important factor to consider is the breakeven price. Any financial return above the breakeven price is profit. The breakeven price is the unit price (price per pound or box) that one must obtain in the market in order to cover the cost of production and marketing. This is a very important price to know when the grower is developing a market plan. Knowledge of the breakeven price provides a sense of security for growers in developing a market plan and selling price, especially if the market competition is strong and consideration is being given to lowering one's price.

The breakeven price is calculated by dividing the total cost of production by the total number of units (pounds) produced. For example if it cost $4,194 to produce 12,600 pounds of cucumbers the breakeven would be $4,194 ÷ 12,600 or $0.33 per pound of cucumbers. If the going market price was $0.79/lb then a grower might feel comfortable dropping his price to $0.69/lb (10¢/lb below the market price) in order to capture a larger share of the market.

Growers who stay on top of their costs can rapidly adapt to changes in the market place with confidence. Knowing where the farm's most profitable opportunities are allows them to make the best use of their resources and help to ensure their success.

This article is part of the Guam Cucurbit Guide from the Agriculture & Natural Resources Department, College of Agriculture & Life Sciences, University of Guam.

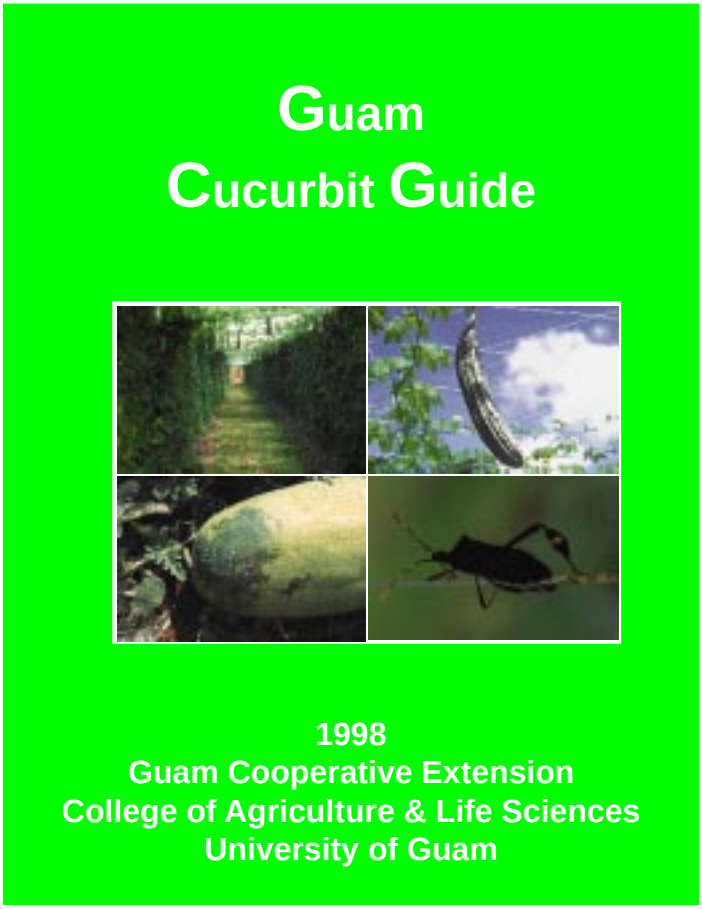
Guam Cucurbit Guide

Edited by Lee Yudin and Robert Schlub

1998; $10 softcover 78 page guide with glossary; 36 color photos of insects, diseases, weeds, and a soil map; 16 figures; 16 tables; 7 recipes.

The Guam Cucurbit Guide is comprehensive in nature and carefully designed to provide Guam's cucurbit growers, agriculture extension agents, agricultural students, and homeowners with a comprehensive manual covering all aspects of cucurbit production. This publication incorporates information from a number of sources as it relates to extension activities on Guam. The sources include compendiums, cucurbit guides and fact sheets from U.S. Land Grant Universities, historical data from the Guam Agricultural Experiment Station, and current research and surveys conducted by faculty of the College of Agriculture and Life Sciences. Since cucurbits are worldwide in distribution, fundamental information on growth requirements, cultivated varieties, diseases, insects, weeds, and nutrients will be of interest to all growers. Even though the production/protection practices in this guide were designed for Guam, the fundamental principles can be applied elsewhere. The goal of this publication is to empower any cucurbit producer with enough general and specific information to enhance learning and encourage sound production practices on Guam and elsewhere.

This guide is designed to be user-friendly and to provide information at various levels of interest. At the initial level, the guide's photo plates can be used as a quick visual reference to many of the insects, weeds, and diseases which are common to cucurbit crops. The unit entitled **Trouble Shooting Cucurbit Problems** indexes symptoms, signs, and plant injuries to various causes with associated page and plate numbers. Detailed information on diagnosing problems using technical equipment (i.e., hand-lens, stereomicroscope, or compound scope) and control recommendations can be found in the **Disease Management** unit. Other units include



Cucurbit Management, **Postharvest Handling**, **Weed Management**, **Management of Insects and Mites**, and **Management of Animal Pests**. To assist growers in applying the principles of integrated pest management, an **IPM Watermelon Pest Survey Form** is provided at the end of the **Management of Insects and Mites** unit. This form advises growers on how to sample their field for insects and when to spray. Individuals needing assistance in determining a farm budget for cucurbits will find **Developing Budgets** of value. The unit on **Food Nutrition** provides nutritional information and gives a few recipes.

To purchase your copy of the Guam Cucurbit Guide, send a **$10.00 check or money order payable to UOG/CALS** to Guam Cucurbit Guide, ANR/CALS, UOG Station, Mangilao, GU 96923. For more information, call us at (671) 735-2080 or email bbarber@triton.uog.edu.

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