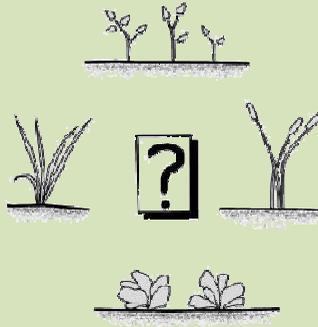


# PRODUCTION PLANNING

A farmer's guide



A publication produced for the  
Caribbean Farmers Network (CaFAN)



This document has been produced by CaFAN, with the financial assistance of the Technical Centre for Agricultural and Rural cooperation (CTA - ACP - EU). However, the views expressed herein can in no way be taken to reflect the official opinion of CTA.

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# Introduction

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Production planning is one of the key components of proper farm management and becomes important as farmers are linked to markets. Good crop production planning helps farmers to maximize the quantity, quality and profitability of crops produced on a farm.

CaFAN volunteers work with producers to estimate their costs of production, taking into consideration that cost of production and yields varies due to various factors ranging from soil type, chemical application, fertilizer application, equipment usage and other agronomic practices used. CaFAN encourages farmers to combine cropping systems not only to maximize yields, but also to maintain soil fertility and sustainable agriculture production.

To achieve success, attention must be given to improving economic practices such as crop rotation, planting methods, spacing, fertilizer application, and pest and disease control.

In addition, losses of crops through flooding could be significantly reduced by design drainage schemes, etc. Soil conservation measures are needed to reduce the risk of soil erosions. The establishment of irrigation facilities will also help to increase yields.

With the assistance of its partners, CaFAN has produced several booklets, including a Cost Production Manual, a Farm Management Booklet and a Record Keeping Booklet. These production planning and management tools can assist in the farming business and are enhanced and strengthened with the practical production experience of farmers.

This booklet is designed to provide very basic information on how production should be planned. It discusses topics such as

1. Crop selection
2. Marketing
3. Cost of production
4. Machinery and equipment
5. Soil testing
6. Irrigation
7. Cost of harvest

For more information, please contact the CaFAN Secretariat.

# Crop Selection

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Choosing what crops to grow is an essential decision of any farm enterprise. The crop selected will depend on the availability of land space, market accessibility, soil type, knowledge of production techniques, labour, available finance, cost of production, consumer demand, etc.

## Crop Rotation

It is advisable not to grow continuously the same crop or crops of the same family on a given land area. This may decline in soil fertility and a buildup of pests and diseases. To avoid these problems and ensure better yields, a crop rotation scheme must be completed.

*For example, growing Dasheen and cabbages in year one and ginger and peppers in year two.*

It will help to develop a crop rotation schedule as shown below:

Months	#1 $\frac{1}{2}$ acre	#2 1 $\frac{1}{2}$ acres	#3 1 acre	#4 1 acre	#5 1 $\frac{1}{2}$ acres
1 - 4 (Jun - Sept)	Ginger	Ginger	Ginger		Dasheen
5 - 8 (Oct - Jan)				Tomatoes	
9 - 12 (Feb - May)				Peppers	
13 - 16 (Jun - Sep)	Eddoes	Peppers			
17 - 20 (Oct - Jan)			Tomatoes		Dasheen
21 - 24 (Feb - May)		Ginger		Ginger	

# Developing a Crop Plan

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It is also advisable to have a crop plan that considers the critical concerns of choosing from among alternative crops and preparing a crop budget as shown in Figure 1. Based on the identification of the farm enterprises, in order to determine the profitability of each of the alternative enterprises, the gross margin of each crop is calculated. Acreage planted is allocated on the basis of gross margin, which is defined as the percentage by which profits exceed production costs (variable and fixed costs incurred during all stages of farming process).

## Calculation of Gross Margin

### Tomatoes

#### Vale of Sales

Yield per acre	x	unit selling price	=	Value of Sales
12,000 lbs	x	\$ .80	=	\$9,600.00

#### Production Costs (1 acre assumed)

Land Preparation -	\$ 600			
Seeds	-	120		
Fertilizer	-	160		
Sprays etc	-	700		
Labour	-	1,050		
Other materials	-	<u>150</u>		
		<u>\$2,780</u>		<u>\$2,780.00</u>
Gross Margin				<u>\$6,820.00</u>

The Gross Margin can then be identified for each enterprise. For example:

Enterprise	Gross margin
Dasheen	\$10,000
Sweet Potatoes	\$ 8,500
Ginger	\$12,500
Peppers	\$ 5,500

Based on the above information, the farmer can then select which is likely to give him a higher profit margin. For example, Ginger is showing the high Gross Margin. The farmer can then decide to plant his total acreage of land (eg. 5 acres) with Ginger. However, realistically, the farmer will have to consider whether or not planting all of one crop will cause a market glut, and therefore cause the prices to drop. Other practical considerations such as the suitability of the land, long-term rotation plans, personal need, farm topography, etc. will also influence the allocation of acreage to different crops.

# Marketing

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Marketing is very important when planning production and this will also determine the crop and acreage planted. It is important that good marketing resources, tools and information are available so that the produce reaches the consumers efficiently. Greater marketing efficiency will ensure higher prices to the farmer. Domestic, regional, and overseas export markets should be targeted.

However, when exporting to overseas markets, the crops produced must meet the export requirements. Careful study must be done to understand the market requirements since some markets specifications differ.

Farmers will also need to be aware of the cost of production for each enterprise so that they can determine the selling price of the crops grown and will also determine their gross margin.

## Cost of Production

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Production costs are usually classified into two main categories: variable cost and fixed costs. The classification of a particular cost depends partly on the nature and timing of the management decisions being considered since some costs are fixed in relation to certain decisions, but others remain variable. In calculating these costs, the farmer will help to reduce the cost per unit of output.

**Variable Costs** are per-unit costs that occur only when a certain crop is produced (it does not occur if nothing is produced) and it tends to vary according to the size of the farm enterprise (level of production). The starting point for estimating variable costs is to estimate the amounts of inputs in producing a particular crop. For example, seeds/planting materials, fertilizers, insecticides, transportation costs, irrigation water, farm labour, packaging materials, etc.

**Fixed Costs** are expenses spread throughout the farm enterprise and remain the same regardless of the volume of the crops grown. For example rent of land (if renting), costs of machinery and equipments, irrigation equipment, fencing, farm shed, maintenance, machinery depreciation, etc. The levels of these inputs do not change with the level of output and it is often difficult to divide fixed costs inputs into the different farm enterprises. However, fixed costs are costs that have to be paid whether or not production takes place.

# Machinery and Equipment

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Decisions that affect farm operations for many years must be part of the long run farm plan. When decisions are made that will affect costs, returns and production requirements for many years, unless they are made with the long-term contribution in mind, the farm operator can be saddled with an undesirable and unprofitable situation far into the future.

When choosing to purchase farm machinery and equipment, the farmer must:

1. Determine the value of labour saved by the introduction of machinery and equipment
2. Determine the variable and fixed cost of operating the machinery and equipment
3. Compare the value of labor saved with the cost (variable and fixed costs) of operating the machinery and make a decision as follows:
  - a. If the value of labour saved is greater than the costs of operating the machinery, the decision should be: *purchase machine and equipment*
  - b. If the value of labour saved is less than the cost of operating the machinery and equipment the decision should be: *do not purchase.*

## For example:

A farmer has to decide whether to use labour or a tractor and equipment to plant 10 acres of vegetable crops. The cost of the tractor and equipment together with the estimated useful life is as follows:

Machinery and Equipment	Estimated Costs	Estimated Life
Tractor	\$30,000	10 years
Equipment	\$ 6,000	10 years

The operating costs (fuel, oil repairs) of the tractor and equipment are \$100/hour and the cost of labour is \$3.00/hour.

### 1. Value of Labour saved

(Preparing and planting 5 acres of land:

800 hours @ \$3.00/hour)

\$ 2,400.00

## 2. Variable costs

(Preparing and planting 5 acres of land by tractor and equipment (30 hours @ \$100/hour) \$ 3,000.00

### Fixed Costs

Annual wages of driver \$ 9,000.00

Depreciation of tractor \$30,000/10 years \$ 3,000.00

Depreciation of Equipment \$6,000/10 years \$ 600.00

Total Variable and Fixed Costs \$15,600.00

3. The value of labour saved is less than the cost of operating the equipment and machinery, hence the decision is '**do not purchase**'

## Soil Testing

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Soil testing is important so that a farmer can determine the best type of fertilizer to use on his/her farm and will increase his yield. A soil test once every three to five years is usually adequate. However, if fertility and soil pH levels for specific plants are important to you, test more often.

One of the most important steps in soil testing is collecting the soil sample. The soil sample is the first part of the soil testing process and the foundation for information derived from laboratory analyses, soil test interpretations, and recommendations.

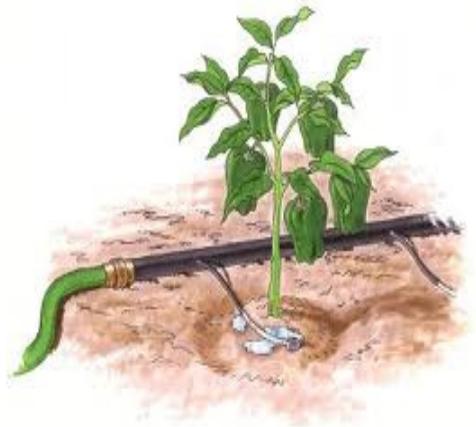
Take the soil sample well before planting, so there is time to treat the soil. Soil samples can be taken any time the soil is suitable for spading or tilling, but end of the rainy or beginning of the dry season gives enough lead-time to plan ahead. However, if a situation develops that suggests soil fertility may be the problem, collect samples immediately. Taking soil samples from the "normal" and "abnormal" plant growth areas is helpful for comparison.



# Irrigation

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The use of irrigation is important in increasing crop production in dry seasons. However, irrigation alone will not ensure that additional profit is derived from crop production. Water must be applied at the right time, in the right amount and at the proper rate. To achieve higher yields irrigation must be combined with those cropping practices which will ensure making most of the available water, especially in dry seasons. What is essentially required is an irrigated cropping system.



There are several types of irrigation systems. Selection of the type of irrigation system will be determined by several factors such as:

- Slope
- Crop type
- Field size
- Soil texture
- Topography
- Available irrigation stream size
- Amount and intensity of rain and
- Economic and social aspects (labour, materials and other costs)

The two main irrigation systems that you might consider are:

1. The drip system which is best suited for slopes
2. The sprinkler system which can be used on all types of soils, on uneven terrain and slopes to more than 30%. With sprinkler irrigation water is not wasted and soils are not eroded.

Please note that irrigation investment and operating costs are usually very high and constantly rising.

# Cost of Harvest

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A farmer who has planted crops mainly to satisfy the personal food requirements of his family, generally pays little or no attention to the cost of harvesting such crops. However, when crops are planted to earn money, special consideration should be given to the cost of harvesting and marketing of crops since these costs to some extent determine how much money will be earned.

Most farmers find themselves in situations in which diseases, insects, hurricanes, etc., have reduced the yield of crops or the price which the crop can fetch in the market is much lower than expected. Reduced yields and/or lower prices lead to lower value of sales than expected. In these situations, the decision on whether or not to harvest a crop becomes very important.

To determine whether a crop should be harvested, the farmer must determine the expected gross value of sales, the harvesting costs and the marketing costs.

He/she must make decisions using the following guide:

1. If monies received from selling crop is greater than sum of harvesting and marketing cost, harvest crop.
2. If monies received from selling crop is less than harvesting and marketing costs, do not harvest crop.

**For example:**

## **Sales vs. Costs**

Crop	Yield	Expected Value of Sales	Harvesting Costs	Marketing Costs
Yams	10,000	\$3,000	\$800	\$200
Tomatoes	6,000	\$1,800	\$1,700	\$200

## **Decision**

1. Monies received from selling of yams (\$3,000) greater than sum of harvesting and marketing costs (\$800+200). Harvest yam crop.
2. Monies received from selling of tomatoes (\$1,800) is less than sum of harvesting and marketing costs (\$1,700+\$200). There is the option not to harvest the crop, or alternatives could be to:
  - a. Harvest crop and cut losses.
  - b. Increase sales price to cover costs of production.

# Example of Ginger - Cost of Production

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## Planting Material

1. Use unwashed pieces of ginger of about 2 ounces.
2. Each piece should have 2 eyes or buds
3. Pieces should be pre-sprouted to about 1 inch.

## Land Preparation

1. Clear and plough the land 12 inches deep.
2. Build ridges 12 inches high and 24 inches apart.
3. Before planting, apply:
  - a. 1  $\frac{1}{2}$  lbs. of a phosphorous-based fertilizer to every 33 feet of trenches.

## Planting

1. Plant ginger in the trenches
2. Ginger is planted 10 to 12 inches apart.
3. 1,000lbs of ginger is needed to plant 1 acre of land.
4. 1 month after planting, apply 1 tablespoon of compound fertilizer to each

plant. Repeat for the following two months.

## Harvesting

1. Ginger is harvested 9 months after planting.
2. Weed fields of all grass.
3. Insert fork deep beneath the clump and lift carefully.
4. Do not break off any part of the ginger. This will be done in the pack house.

## Important

- Rotate your crops.
- Planting a crop of ginger in the same spot year after year will use up on set of nutrients in the soil and increase the fungal and nematode population.

For example, every other season, plant a different crop, such as legumes, in your field to put back the nutrients.

For example if you plant:

- 2008- Ginger
- 2009- Pigeon peas
- 2010- Ginger
- 2011- Tomatoes
- 2012- Ginger

## COST OF PRODUCTION



**CROP: GINGER**

**ACREAGE: ONE (1) ACRE**

**VARIETY:**

**DATE: 31/01/2011**

**COUNTRY: SAINT VINCENT AND THE GRENADINES**

**PRICE: XCD**

ITEMS	UNITS	RATES (\$)	NO	COSTS
LABOUR OPERATIONS				
Land clearing (Cutlass & Clean) / Spraying	M/day	\$40.00	17	\$680.00
Ranging	M/day	\$40.00	14	\$560.00
Forking	M/day	\$40.00	12	\$480.00
Gathering / preparation of planting material	M/day	\$40.00	8	\$320.00
Chopping holes and planting	M/day	\$40.00	6	\$240.00
Weeding manually (X3) & Moulding (X1)	M/day	\$40.00	38	\$1520.00
Fertilizing- Band application (X2)	M/day	\$40.00	4	\$100.00
Harvesting (pull, cut, wash, dry, bag)	M/day	\$40.00	30	\$1,200.00
Heading out of field	M/day	\$40.00	3	\$120.00
<b>SUBTOTAL</b>				<b>\$5220.00</b>
MATERIALS				
Planting Materials (Seeds)	Lbs	\$0.50	2000	\$1,000.00
Gramaxone & pre-emergent	Gal	\$169.00	1	\$169.00
Fertilizer (NPK)	Sack	80.00	12	\$960.00
Equipment (e.g.) Fork, Hoe,		\$225.00	1	\$225.00

<b>Cutlass, File, Rake</b>				
<b>Tools (e.g.) Fork, Hoe, Cutlass, File, Rake</b>		\$250.00	1	\$250.00
<b>Other (bags)</b>		\$1.00	100	\$100.00
<b>SUBTOTAL</b>				<b>\$2,704.00</b>
<b>OTHER COSTS</b>				
<b>Land Charges (Lease)</b>	Acre	\$300.00	1	\$300.00
<b>Transportation</b>		\$200.00		\$200.00
<b>SUBTOTAL</b>				<b>\$500.00</b>
<b>Total Cost of production (\$)</b>				<b>\$8,424.00</b>
<b>Total cost per unit of output (\$/Lb)</b>				<b>\$0.28</b>
<b>ASSUMPTIONS</b>				
<b>a) Plant spacing</b>	1X2 Within Row X Between Row (inch)			
<b>b) Plant density</b>	21780 Plants per acre			
<b>c) Marketable Yields</b>	30 000 Lbs			
<b>d) Maturation Period</b>	10 months			
<b>e) Price per unit yield - Farmgate:</b>	\$0.75 /Lb			
<b>Wholesale:</b>	\$1.00 /Lb			
<b>Retail</b>	\$2.00 / Lb			

# A Production Guide on Carrots

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## **Carrot Production**

The Ministry of Agriculture, St. Vincent and the Grenadines in its effort to increase Carrot production for both domestic consumption and the export market has developed this guide aimed at improving both quantity and quality of the Carrots produces.

## **Seasonality**

Carrots can be produced all year round, giving better quality roots in the dry season with the use of irrigation.

## **Duration of Crop**

Carrots take 12-16 weeks from seeding to maturity depending on the variety.

## **Varieties**

The two (2) recommended varieties are Danvers Long, and Yardley 2. Both varieties are long, slender golden in appearance and tender in quality.

## **Soil Type**

Carrots give the highest production on well drained, light sandy soils as well as deep, loose, loamy soils. Avoid heavy clump because this causes the roots to become distorted.

Carrots produce poor yields on Acid soils. The best Ph is between 6-6  $\frac{1}{2}$ .

## **Land Preparation**

1. Stale bed preparation could be carried out 2-3 weeks before planting using Round UP or 2-4D.
2. The land should be thoroughly prepared before seeding.
3. Plough to the depth of 12" and work to a fine tilt on flat or gently sloping lands.
4. Prepare flat-topped beds 4ft wide as long as practicable along the contours.
5. On heavier soils use effective drains.

## **Spacing and Planting**

Carrots are directly seeded. Seeds should be planted  $\frac{1}{4}$ " deep and thinned to 3" apart within rows and 9" apart between rows. About 3lbs of seeds will be required to plant 1 acre. Avoid planting during times of heavy rainfall. Such rains can result in heavy loss of seeds and seedlings.

## **Fertilizing Application**

Incorporate NPK (16-8-24) or (13-7-23) at final land preparation at a

rate of two (2) sack/acre. If TSP is available also incorporate one (1) sack/acre.

Follow-up this for heavier soils fertilizer at four (4) weeks and seven (7) weeks after germination at a rate of 1  $\frac{1}{2}$  sacks to acre. For lighter soils fertilizer at two (2), five (5) and seven (7) weeks after germination at a rate of one (1) or two (2) weeks after germination.

TSP should be placed in the root area. If soil acidity is a problem use Limestone as necessary.

**Weed Control**

**1. Pre-emergence Herbicide**

Apply Pendimethalin (Prowl 42.3 EC) at 3 1/3 pints (1575 ml)/acre

**2. Post-emergence Herbicide**

To control annual and perennial grass weed, apply Fusillade at 1  $\frac{1}{2}$  to 3 pints per acre. Where hand weeding is done be careful not to disturb carrot roots.

**Harvesting**

Harvesting of carrots generally entails pulling and topping the field, leaving approximately a half inch of leaf base attached to the tuber. Carrots must be topped soon after pulling, and protected from direct sunlight.

**Yields**

In-season approximately 15 000lbs per acre can be obtained. Yields may be adversely affected during the rainy season.

**Pest Control**

<b>Pest</b>	<b>Pesticide</b>	<b>DTH</b>	<b>Comments</b>
Sucking: Aphids	Diazinon	10	-Common Pesticide Name: Diazinon -Sucking insects are only occasional pest on this crop. Those that attack the leaves can leave white stippling or fine brown spotting as evidence of their presence. They are generally found on the underside of the leaves
Leafhoppers	Diazinon	10	-Common Pesticide Name: Diazinon -Their toxic saliva causes spotting (white specks),

			yellowing, leaf curling, stunting and distortion of plants -Floating row covers can be used as a physical barrier to keep leafhoppers from damaging plants
Leaf miners	Diazinon or Dimethoate or Cyromazine	10 7 14	-Common Pesticide Name: Perfekthion, Systoate Trigard
Biting (Chewing): Leaf-eating Caterpillars	Cypermethrin or Decamethrin or Permethrin	1 0 3	-Common Pesticide Name: Sherpa Decia Ambush
Cutworms	Diazinon or Pirimiphos-ethyl	10	Apply Diazinon after sowing; (e.g. Ambush, Sherpa, and Decis) as soon as damage first becomes apparent.
Other Ants	Diazinon or Primiphos-ethyl	10	Spray field soon after sowing with either Diazinon.



## COST OF PRODUCTION

**CROP: CARROTS**

**ACREAGE: ONE (1)**

**ACRE**

**VARIETY: DANVERS 126**

**DATE: 31/01/2011**

**SCIENTIFIC NAME: DAUCUS CAROTA**

**COUNTRY: SAINT VINCENT AND THE GRENADINES**

**PRICE: XCD**

ITEMS	UNITS	RATES (\$)	NO	COSTS
<b>LABOUR OPERATIONS</b>				
Land clearing (Cutlass & Clean) / Spraying	M/day	\$40.00	17	\$680.00
Ranging	M/day	\$40.00	15	\$600.00
Forking	M/day	\$40.00	8	\$320.00
Digging Banks	M/day	\$40.00	10	\$400.00
Sowing (Including refine soil and mark lines)	M/day	\$40.00	6	\$240.00
Insecticide application	M/day	\$40.00	2	\$80.00
Thinning out	M/day	\$40.00	2	\$80.00
Weeding manually (X2) & Molding (X1)	M/day	\$40.00	25	\$1000.00
Fertilizing- Band application (X1)	M/day	\$40.00	1	\$40.00
Harvesting ( pull, cut, wash, dry, bag)	M/day	\$40.00	27	\$1080.00
Heading out of field	M/day	\$40.00	3	\$120.00
<b>SUBTOTAL</b>				<b>\$4,640.00</b>
<b>MATERIALS</b>				
Planting Materials (Seeds)	Oz	\$92.50	2	\$185.00
Fertilizer (NPK)	Sack	\$80.00	4	\$320.00

<b>Gramaxone and pre-emergent</b>	Gal	\$169.00	1	\$169.00
<b>Insecticide ( Sevin, Basudin)</b>	Fl.oz	\$3.50	18	\$63.00
<b>Equipment (e.g.) Fork, Hoe, Cutlass, File, Rake</b>		\$225.00	1	\$225.00
<b>Other (Bags)</b>		\$250.00	1	\$90.00
<b>SUBTOTAL</b>				<b>\$1,052.00</b>
<b>OTHER COSTS</b>				
<b>Land Charges ( Lease)</b>	Acre	\$300.00	0.33	\$100.00
<b>Transportation</b>		\$200.00		\$200.00
<b>SUBTOTAL</b>				<b>\$300.00</b>
<b>Total Cost of production (\$)</b>				<b>\$5,992.00</b>
<b>Total cost per unit of output (\$/Lb)</b>				<b>\$0.75</b>
<b>ASSUMPTIONS</b>				
<b>a) Plant Spacing</b>	1X10 Within Row X Between Row(inch)			
<b>b) Plant density</b>	631304 plants per acre			
<b>c) Marketable yields</b>	8000 Lbs			
<b>d) Maturation Period</b>	3- 3.5 Months			
<b>e) Price per unit yield - Farm gate:</b>	\$2.00/Lb			
<b>Wholesale</b>	\$2.25 /Lb			
<b>Retail</b>	\$3.50 / Lb			

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