

CHAPTER 16

ECONOMICS OF CEA/HYDROPONICS AND BUSINESS PLANS

INTRODUCTION

- *Controlled environment agriculture and hydroponics is often labeled as “intensive”.
To an economist, intensity is related to the labor and capital inputs per unit of land involved.
Compared to open field agriculture, the labor and capital inputs per unit of land for CEA/hydroponics are much greater.
- *However, because of the potential for multiple cropping and higher yields, as well as the high cash value of crops chosen for CEA/hydroponics, the high returns can more than make up for the costs.

POTENTIAL ECONOMIC ADVANTAGES OF CEA/HYDROPONICS

*Multiple cropping

With almost all forms of CEA and hydroponics growers can produce multiple crops in a single year. Open field agriculture is usually limited to one. Greenhouse hydroponic tomatoes are now grown year around with 2 overlapping crops, one that produces from October to March and the second that produces from March until either July or the next October (see Chapter 3). Greenhouse hydroponic cucumbers mature faster than tomatoes and can produce 3 crops: July to October, November to March and April to June. Greenhouse hydroponic lettuce, with as little as 40-45 days to maturity, can yield up to 10 crops per year.

*Higher yields

Several factors contribute to higher yields with CEA and hydroponics:
Control of the aerial environment – temperature, relative humidity, carbon dioxide levels, light, etc. – to maximize plant growth and productivity.
Control of the root environment – temperature, moisture levels, nutrient composition, oxygen levels, etc. – also to maximize plant growth and productivity.
Higher planting densities that result in higher productivity per unit area.
Even mulches and row covers can double, even quadruple early yields (before open field products are ready for market and the prices are therefore higher).

- *However, these increased returns, in the form of multiple crops and higher yields, are realized only by an increase in costs.

THE COSTS OF CEA/HYDROPONICS

***The land:**

The initial cost of the land, roads and utility installation (water, sewer, natural gas, electricity, phone, etc.) will usually need to be paid up front via a loan and will then be paid off over the first several years of operation.

The land may also need to be modified to accommodate greenhouse and support buildings including grading, fencing, wind breaks, etc.

***Structures:** These can be amortized over several years.

The greenhouse itself (frame, glazing, construction labor, environmental control system, white reflective ground cloth for the greenhouse floor and the nutrient delivery system – injectors, mixing tanks, PVC delivery tubing).

Support buildings

Office space with restrooms

Packing area

Storage area for produce which might include a cold room

Storage areas for supplies including seeds, growing media, fertilizers, boxes, irrigation equipment, support devices (clips, tomahooks, etc.), tools, ladders, gloves, smocks, etc.

Workshop with equipment for fabrication and repairs

***Annual expenses:**

Seeds or transplants

Growing media (rockwool, perlite, etc.) – cubes, blocks, slabs, bags, etc.

Irrigation equipment (poly and drip tubing with stakes, emitters, misc. plastic)

String for plant support

Tomahooks, vine clips and cluster clips (if these are not recycled)

Fertilizers

Labor: May divide duties (plant care, harvest, packing, office, etc.)

Should also include training costs

Management costs

May include training costs, travel, etc.

Misc. tools, ladders, gloves, etc.

Repairs and replacement parts on the structure, environmental control system, nutrient delivery system, tools, etc.

Marketing expenses

Utility costs (water, electric, natural gas, phone, sewer, etc.)

Bee hives (tomatoes and peppers) and beneficial insects

Limited pesticide equipment

Insurance, taxes and interest payments

Carts, bicycles and other vehicles

***Other expenses** may be incurred depending upon the type of structure, crop, location, and other considerations.

PREPARING A BUSINESS PLAN

- *A business plan is a formal document that will help you
 - Define the purpose of your business including personal and business goals
 - Discover problems before you begin the business
 - Take advantage of new opportunities as they occur
 - Estimate the cash needs for your business
 - Explain your business goal to others including loan agents, investors, etc.
 - List your skills and abilities as well as what is needed
 - Outline marketing prospects

*Elements of a business plan (As described in the booklet “Preparing a Business Plan”)

Title page

- Make this look as professional as possible.
- Include the company name, the date, contact person, contact information

Table of Contents

- Gives an outline of your plan

Business Profile and Summary

- Purpose and concept of your business
- Financing and financial resources required
- Business activities and targets – marketing, production, labor, financial and projected income/net worth

Business Organization

- How the business is organized
- Any required registrations and/or licenses
- Business managers and advisors and their roles

The Marketing Plan

- About the industry including market trends and competition
- Political and legal constraints
- Consumer responses
- Pricing
- Advertising/promotion
- Targets and future sales

The Human Resources Plan

- Employee plan – how many employees, job titles, functions
- Organizational chart – How the employees are organized
- Compensation and benefits
- Labor relations: training, motivation, discipline procedures, etc.

The Production Plan

- Description of the land, buildings and facilities
- A list of all the equipment needed (environmental control, auxiliary power units, spray equipment, scales, meters, tools, heavy lift equipment, electric or other carts, vehicles, etc.)
- A list of all the materials and supplies needed
- The production strategy (specifics about the crop and system to be used)
- Construction/production schedule (week by week plan)

The Financial Plan

Income statement (income from sales, operation expenses, net income)
Projected cash flow summary
Projected statement of assets, liabilities and equity for the next 3 years
Capital sales and purchases (land, buildings, equipment
Loan summary (type of loan, security given, interest rate, etc.)
Financial performance indicators (profit, growth and risk ratios for the first 3 years)

The Long-Range Plan

Should cover the next 5-10 years
Include business goals and objectives, additional production, financial and management or marketing skills required

*Final note: Any person considering starting a CEA/hydroponic business should as much as they can about plant science, nutrition, diseases and IPM techniques, greenhouse structures and control systems, marketing and business management practices. More information about business planning can be obtained from local financial institutions, state departments of agriculture, or other appropriate agencies.

REFERENCE MATERIAL

- 1. Preparing A Business Plan: A Guide For Agricultural Producers.** 1992. Published by the Extension Systems Branch, British Columbia Ministry of Agriculture, Fisheries and Food, 808 Douglas Street, Victoria, B.C., Canada, V8W 2Z7. ISBN 0-7726-1514-4
- 2. Protected Agriculture: A Global Review. Part 4. Economic Factors.** 1995. M.H. Jensen and A.J. Malter. The International Bank For Reconstruction and Development/The World Bank. 1818 H. Street, N.W., Washington, D.C. 20433. World Bank Technical Paper. ISBN 0-8213-2930-8.