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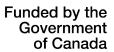
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FOREWORD

This fact sheet was created in order to guide persons who wish to launch an urban farm for the production of microgreens or real estate developers and real estate managers who wish to host this type of farm projects in their buildings.

Based on business case analyses as well as on data collected from numerous microgreen producers in various contexts, this fact sheet supplies basic information on the potential costs of setting up and operating such a farm. They are guidelines as numerous factors can influence a project's final costs or the operation costs, which are very difficult to predict. The data was collected in 2018 and 2019.

This fact sheet is part of a series of economic fact sheets aiming to create an economic framework for the development and implementation of urban farms. This series is in addition to other work done by the CRETAU more specifically on the launch of urban farming businesses, on the environmental services of urban farms (economic value for the city) as well as the economic impact of commercial urban agriculture.

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URBAN FARMS PRODUCING MICROGREENS

Growing microgreens has wind in its sails. Since 2018, more than 8 new urban agricultural enterprises in Quebec have specialized in this production. There are also small suburban agricultural producers who use it as a financial complement to their vegetable crops. The microgreen production cycle is quick, and the products have a high market value.

There are now more than 14 urban producers who have specialized in this production. They have joined Ferme Pousse-Menu, one of the oldest urban farms in the world in operation since 1988. Furthermore, in Europe, the production and consumption of microgreens are at their infancy despite the presence of Koppert Cress, a Dutch multinational enterprise (MNE) specialized in the sector since 2002. However, there are numerous urban agricultural enterprises such as ECLO (Belgium) or Le paysan urbain (Paris and Marseille) that are rapidly developing in European countries.

Farms producing microgreens vary in size from the small-scale producer in facilities as small as 10 m², to the farm employing more than 16 persons and distributing on a large scale in supermarkets.

Nonetheless, this type of agricultural enterprise is not without challenges, including that of supplying a very fresh product, with a diversified production that responds to customers' needs. Microgreens are fragile and can quickly lose quality when not well stored or if they are distributed too late. One of the advantages of an urban agricultural operation is that it is remarkably close to the customers. And as this culture performs well in intensive vertical production, it is very well adapted to the urban world that possesses numerous indoor spaces.

This economic fact sheet, edited by the CRETAU is accompanied by the publication of a practical guide to launch an urban production of microgreens. It is the result of research started in 2017 at AU/LAB, responsible for CRETAU, as part of the incubation of a young entrepreneur wishing to launch their microgreen farm.

TYPES OF FARMS PRODUCING MICROGREENS

Greenhouses or indoors

Farms producing microgreens are of various forms. It is possible to produce in greenhouses or indoors. The overwhelming majority of urban producers grow their production indoors, often in basements or in industrial buildings. The production process for microgreens is essentially done without natural light. Knowing that it is not necessary to work with natural light, producers may as well find the space with the lowest costs, which is often located in basements and use artificial light.



Production of microgreens indoors in the Avril store in Laval.

Photo: Éric Duchemin

Horizontal or vertical

If some of the farms producing microgreens grow them horizontally or on one layer —those that produce in greenhouses—the vast majority grow them vertically to optimize space and thus increase the yield per square metre.



Horizontal production of microgreens in one of Paysan urbain's greenhouses in Paris. Photo: Éric Duchemin

Soil or grow mats

The choice of growing medium can vary greatly and for some enterprises, this choice is part of research activities aiming to include operations in a circular economy model or to reduce the environmental impact of its operations. Growing in soil is generally done with a substrate composed of a mix of peat, coco fibre, vermiculite and compost. Some enterprises, however, develop innovative substrates, such as wood fibre extracts (cellulosic filament). The other possible growth support for microgreens is a grow mat. These mats can have numerous compositions: hemp, cotton, recycled plastic, etc. In such a situation the growing system will be hydroponic.



Production of microgreens in soil. Photo: Pousses en ville, Québec

KEY PARAMETERS TO LAUNCH AN URBAN MICROGREEN FARM

The production of microgreens has numerous advantages. Firstly, its production cycle is short, and it is possible to produce intensively on a small surface. Then, the multiple microgreen varieties allow for a diversity of tastes and textures, which is an advantage (or an asset) for restaurants. Finally, this high market-value crop can be produced at a low cost, both at start and during ongoing production.

An efficient production system in terms of human resources and ergonomics (module)

An efficient production system is the basis of a viable project. The implemented system must require as few human resources as possible while assuring optimal production conditions, especially where irrigation is concerned. Microgreen farms such as Orenda, Ôplant and ECLO have developed such modules. The set-up of a germination room (100% humidity and 26°C) which gives excellent yields and very little mould (in comparison with the use of domes) is also an important asset.

A broad and diversified distribution system

Another important parameter is the development of a diversified distribution system. Working with distributors or partners who buy large quantities without having to manage all the logistics related to direct sales allows producers to spend more time on production. In contrast, direct distribution to individuals and restaurants as well as retail outlets involves higher human resources management, as these customers generally purchase small quantities at a time. Microgreen producers such as Kýma or ECLO have entered into partnerships with grocery stores. ECLO has also partnered with various vegetable growers who do not wish to take on the production of microgreens. Ôplant has entered into an agreement with a fruit and vegetable distributor so that its products are distributed to restaurants and hotels. The Pousse-Menu and VERTige farms have entered into supermarkets. This last choice implies a quality follow-up in the store, as the product can stay longer than planned in the grocery store and not be well managed by it.

Standing out

It is important to stand out, especially in a niche production that can be or become competitive in some regions. This is already the case in some regions.

Packaging allows producers to stand out from other products offered on the market. As microgreens are appealing products, it is worth making them stand out with packaging.

Another key for the success of a microgreen farm is to stand out by offering diverse tastes. However, standing out with diverse varieties is more difficult, as producers quickly find themselves with the same types of seeds, since they have access to a limited number of seed producers. Finding and retaining a seed producer is essential for the consulted microgreen producers. Some even go as far as purchasing large quantities (more than necessary) in order to access seed producers who only sell in large quantities. These seed growers' catalogues are generally very varied, which makes it possible to access unique varieties.

If access to these seed growers is difficult or even impossible, it is possible to stand out with mixes that match customers' tastes or by demonstrating knowledge in the matter, if the sale is in bulk on a market. Why not give them evocative and local names?

Marketing

Microgreens can be marketed *living* or *precut*. Offering both adds lots of interest to the products offered, as it allows to reach two types of customers: those who love the living and those who do not want any soil in their restaurant or at home. Offering both also allows to market microgreen mixes made of excess production that can be sold cheaper. This can be appealing for both stores and restaurant owners. Many restaurant owners are looking above all to put colour in their dishes at a reasonable cost.

The packaging used for marketing is also a challenge. The consulted farms prefer using compostable or reusable containers as much as possible. Kýma farm has been testing for a few months, with a bulk grocery store, the use of returnable glass containers.

Pairing with complementary products

The production of microgreens is a very niche production. It has many advantages and a high economic value, but to ensure their project's longevity, producers should ensure that their production includes other products or strike natural collaborations with other producers. In this manner, ECLO is collaborating with Champignon de Bruxelles, farms such as Kýma and Ôplant are working on diversifying their production with leafy vegetables. Ferme Pousse-Menu has, for its part, has begun processing. For numerous enterprises, it is one of the most important keys for success.

The fair price

It is above all important not to sell the microgreens at too high a price, using the unique argument that it is a local product. It is recommended to establish a price based on the current market price (what is the average price of competitors on the same market?) and then to calculate margins using this price (cost of seeds, soil, etc.). At an equal price, chefs will prefer the local product or the one that better meets their needs or their values. Microgreen enterprises can rapidly convince hundreds of customers in this way.

CASE STUDIES

This section presents various cases, which, each in their own way, gives information on the viability of an urban microgreen farm and illustrates the key parameters of a project that will work.

ECLO



The production of microgreens at the ECLO urban farm. Photo credit: Kevin Faingnaert.

ECLO, a microgreens farm, is installed in the cellars of Cureghem under the Abattoirs de Bruxelles in Belgium and shares the space with Le Champignon de Bruxelles mushroom farm.

ECLO'S founder developed his project and carried out his production tests in Montreal before starting his enterprise in Brussels in November 2017. ECLO's activities have started in a space offered free of charge in the cellars of Cureghem and the first sales occurred in January 2018. As the founder still spends a large part of his time at another job and does not have enough time to develop his customer base, he has a distributor who sells his production to 20 restaurants. He produces eight varieties of microgreens. Three other competing microgreen projects started at almost the same time in Brussels in November 2017, January and March 2018.

In 2018, Le Champignon de Bruxelles and ECLO, on top of being neighbours, noticed that their delivery routes are almost the same. The mushrooms sell well during the fall and winter, which generates an interesting revenue, but the sales drop drastically between March and August. For their part, microgreens sell well all year long, but represent a small part of the revenues of the two collaborating enterprises. Although it is easy to launch a project for the cultivation of microgreens, which explains the presence of competitors in that sphere, it is much more difficult

to launch the production of mushrooms. Realizing how their projects are complementary, the two enterprises merge within a cooperative in May 2018.

Since then, the two combined enterprises operate a surface of 3,000 m² in the cellars of Cureghem. A surface of approximately 60 m² is used for the cultivation of microgreens: this surface includes a germination room, seedling trays and a workspace. In addition to the 1,500 m² that is used for the cultivation of mushrooms, the remainder of the space is shared for the preparation of orders, keeping in refrigerators and storage space for raw materials.

Production

ECLO currently markets 25 varieties of microgreens: amaranth, dill, basil, nasturtium, cabbage, chives, coriander, fennel, hibiscus, lovage, mustard, tagetes, sorrel, peas, radishes, arugula, shiso, thyme, etc. and tests are under way to propose new ones. A full-time employee takes care of the production.

The microgreens start their cycle in a germination room where temperature and humidity are controlled. They then go on to their growth stage under LED lights on 4-tier structures, in an environment kept at a constant temperature of approximately 20°C. The heat necessary for the microgreens to grow is supplied by the mushroom's incubation room. The microgreens are automatically irrigated with ebb and flow racks.

At the beginning of 2018, the weekly production was of 300 trays (9 x 9 cm containers) (the equivalent of 20 trays measuring 25 x 50 cm); in 2019, it was of 2,000 trays (the equivalent of 130 trays measuring $25 \times 50 \text{ cm}$) each week.

LED lights not being allowed in organic farming in Belgium, it is impossible to have the microgreens certified, although all the inputs are compliant.

Distribution

€60,000 of microgreens were sold in 2019 to 130 restaurants and to 100 stores (chains and independent grocery stores). The restaurants are supplied through direct sales. It is the case of some stores as well, but most are supplied through two distributors specialized in organic food in Belgium.

Part of the delivery is provided by employees with adapted trailer bikes (very efficient in Brussels's city centre which has a pedestrian zone that has been growing since 2015) and by car for local customers. The distributors provide delivery to customers who are outside of the Brussels-Capital region and to most retail chains.

The microgreens are sold live in plastic trays ($9 \times 9 \text{ cm}$) with soil, mainly to restaurants. Some chefs and stores prefer not to have soil and therefore buy the microgreens already cut in containers; they can then be kept for shorter periods. These can contain 10 g - 30 g or sometimes even 150 g of microgreens in a capped cardboard packaging that conserves humidity. They are sold according to volume and not weight.

Services

Requests for site visits have increased so much through the years that ECLO and Le Champignon de Bruxelles now have professional guides who offer tours in three languages (French, English, Dutch). The services offered include training on fungiculture, consulting for start-ups and the visits for both types of production (microgreens and mushrooms) which represent between 10 and 15% of the annual revenues.

Economic model

At the beginning, ECLO was launched with the founder's personal savings. Indeed, the production of microgreens does not require much investment in equipment, at least at the beginning. The microgreen farm then joined Le Champignon de Bruxelles cooperative in May 2018, after only 5 months of existence.

The company has a total of 22 employees. Human resources represent the cooperative's main expense. In 2019, the sale of mushrooms generated 6.5 times more revenues than the sale of microgreens and the revenue from the visits was equivalent to that of the sale of microgreens.

KÝMA FARM





Ferme Kýma's microgreens at la Centrale agricole. Zero waste marketing in returnable trays and containers. Photo credit: Ferme Kýma

Kýma farm is an indoor vertical farm start-up project established in Montreal within la Centrale agricole, a cooperative made of urban agriculture producers and agri-food sector stakeholders. The project's research and development occurred between 2017 and 2019, when the project was the urban agriculture part of a not-for-profit organization (Paysage solidaire project of the Y'a quelqu'un l'aut'bord du mur). Access to the production site was free, sales were already started and the network well established. The choice of joining la Centrale agricole was nevertheless obvious for both partners of the enterprise: it was for them an opportunity to be part of a group of producers benefiting from long-term synergies and contributing to the rise of urban agriculture that shares common values.

Production

The total surface of the installations is a bit over 165 m², of which 25% serve for the annual culture of microgreens on two five-tier modules. Each module has a capacity of 90 trays measuring 25 x 50 cm. At this stage, approximately 40 trays are sold each week on a total of 63 trays in production. The microgreens are cultivated on soil and grow under LED lights. Production automation is on its way: watering, temperature, dehumidification, ventilation will all be variables which will eventually be automatically controlled. The production method respects organic standards, but certification is not a priority right now.

The second phase of the project is to diversify the production by adding the aeroponic culture of aromatic herbs, leafy vegetables, and edible flowers.

Distribution

Products are distributed through direct sales in restaurants as well as in grocery stores. Sales are done in bulk on trays, so that the customer can harvest directly at the time of purchase, or in returnable glass containers. These containers are then recovered to be washed, sterilized, and reused, for a zero waste sale process.

Delivery is currently provided by employees on bikes, both in summer and winter. It is eventually planned that delivery will be subcontracted to a partner to make more time for production. Other Centale agricole producers could join the partnership to pool costs and make their operations more profitable.

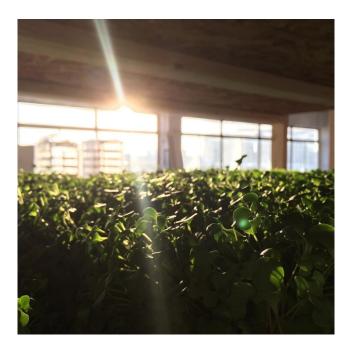
Services

Once the enterprise is well established, the founders wish to offer consulting services and training if there is demand for it. For the moment, the priority is to develop production, and to get new customers and funding.

Economic model

Kýma farm is a corporation. For the moment, 100% of the revenues come from the sale of the production. When the time comes to offer services (consulting services and training), the objective would be of reaching 15% of revenues from these.

The Kýma farm team is made up of two employees, who are also founding members. They are tenants of the production facility located in an industrial-zoned building. Searches for funding and new customers are needed to implement phase 2 of the project, which consists in diversifying the production with an aeroponic system.



ÔPLANT URBAN FARMS



Modules to produce microgreens. Photo credit: Ôplant urban farms

Ôplant urban farms is a microgreen producing enterprise established in Montréal. The enterprise's mission is to offer, 12 months per year, a varied selection of high-quality microgreens that are produced locally using a method that respects the environment. Its vision is to democratize indoor agriculture in urban areas. To do so, Ôplant conceives its one of a kind vertical farm modules, that ensure food safety and quality. Launched in 2015, the enterprise started its activities with a single production module as well as with research and development activities to test different varieties. Ôplant started marketing its microgreens in 2017.

Production

The farm's total surface is 305 m^2 for a yield of almost two tons of microgreens in 2018 and 2019. The enterprise will be moving its operations shortly to bigger facilities to increase its capacity and the microgreen varieties it produces.

Ôplant urban farms produce more than 20 varieties of microgreens. All the microgreens produced are sold cut and fresh, without additional processing.

The microgreens' growth medium is a synthetic polyester textile. To have maximum production control and to minimize losses, the enterprise uses a circular irrigation system. It also possesses various systems and sensors allowing to control inputs according to the plants' needs.

Its founder is involved in various research activities to optimize production methods and minimize the enterprise's environmental footprint. The hydroponic production modules were incidentally created by him. Their cost, however, remains high. It will eventually decrease as their technology evolves.



Guillaume Salvas, the founder of Ôplant urban farms carrying containers of microgreens with his delivery truck. Photo credit: Ôplant urban farms

Distribution

The enterprise's microgreens are sold in large part (58%) directly to restaurant owners. A fruit and vegetable distributor takes 40% of the production and the remaining 2% are distributed in a zero-waste grocery store. To diversify its network of clients, Ôplant plans to increase its sales towards retailers such as grocery stores.

Ôplant developed a digital application for its customers' orders and owns a delivery truck to ensure the distribution logistics. Blanc de gris, a Montréal-based urban mushroom farm uses its distribution services for restaurant owners who are shared customers.

Services

Although the enterprise's main activity is the production of microgreens, it also makes revenue from a distribution service for other urban producers. Around 97% of its revenues come from the sale of microgreens and 3% of its revenues come from distribution services.

In the coming years, Ôplant wishes to build a network of vertical farms operated by entrepreneurs wishing to contribute to the food autonomy of urban communities. This concept could take the shape of franchises.

Economic model

The enterprise needs the equivalent of 3 full-time employees (35h/week) for production. Its founder is also greatly involved at many levels: production planning, commercialization, business development, research and development, etc.

Since it was created, the enterprise has received grants, a bank loan, and loans from its shareholders. These funds have mainly been invested in the establishment of the infrastructure, the purchase of equipment and salaries. In December 2016, Oplant has undertaken renovations of its facilities. In addition, to ensure the freshness of its production, the enterprise has invested in the installation of a cold room and acquired a refrigerated truck.

According to Ôplant, the production activities have reached a break-even point in 2019. It is, however, the time invested by its founder in research and development and other tasks not related to production that have prevented the enterprise from reaching its global break-even point. Many operational and business model improvements are planned in the coming years. Moving the enterprise, still in Montréal, but in larger facilities will allow it to significantly increase its production capacity, among other things. The project of selling Ôplant franchises should also eventually contribute to the enterprise's viability.

The urban agriculture enterprise has had to compose with many issues related to production in urban environments, especially in terms of insurance, permits and zoning. As urban vertical farms are a relatively new concept for cities, the enterprise has needed to deal with numerous regulations since it did not fit into the predefined criteria and categories for businesses. These formalities and constraints have required much time and ingenuity during its establishment.

ORENDA URBAN FARM



Microgreen production at the Orenda urban farm. Photo credit: Orenda urban farm

Orenda urban farm is an enterprise that produces certified organic microgreens located close to Trois-Rivières's city centre since 2017. The farm aims to be a change agent that returns food to its essence: supply the most nutritious products year-round to the community, while always being very respectful of the environment.

The enterprise is a tenant of the production facility located in an industrial zone. The facility's total surface is of 120 m² and the cultivated zone is of approximately 20 m². The remainder of the facilities serve in part to prepare the crops and occasionally, for other activities; it is a component under development (see Services section).

The main objective for the coming years is to obtain the funding and technical resources needed to automate the production to increase the quantity of microgreens sold without increasing the production costs.

Production

The production system uses trays (25x50) placed on the three-tier structures that support artificial lighting. The production is made with soil.

A total of approximately twenty varieties are produced, which makes it possible to have a weekly rotation. Varieties include sunflower, broccoli, kale, peas, corn, red cabbage, Asian mustard, dill, coriander, kohlrabi, radishes, daikon, etc. Each week, around one hundred trays are distributed and sold.

Organic waste is routed to a farm located close to the production site.

Distribution

The Orenda urban farm products are sold directly in markets and restaurants. It is also possible for individuals to order online by becoming partners of the farm in compliance with the community-supported agriculture (CSA) model: the partner buys a number of harvests (5-10-20 harvests) that they can come and get when convenient and according to their needs, and thus avoid losses. This direct sales model ensures greater freshness to customers and it allows them to choose their favourite varieties.

Services

The enterprise's founder would like to eventually monetize the production facilities' unused space by making it available for activities such as yoga, meditation, a climbing rope. Team members offer approximately one workshop per season on the production of microgreens.

Economic model

Orenda urban farm is a corporation. Revenues mainly come from the sale of the production while a small proportion comes from services offered (workshops, rental of the facilities for physical activity). This last component is, however, under development.

The enterprise has between five and seven employees who work part-time: five during winter and six or seven during high season.



Photo credit: Orenda urban farm

ECONOMIC ANALYSIS

BASIS OF THE ECONOMIC RESEARCH

This economic study of farms producing microgreens is based on 4 cases for which we have obtained detailed set up and operation costs as well as the revenues from the production part of the projects.

Table 3. Characteristics of the cases used in this fact sheet.

	Innovation	Kind of marketing
Case 1	Low technological adoption	Direct sales to restaurants,
		stores, and individuals
Case 2	Average technological adoption	Direct sales to restaurants and
		stores
Case 3	High technological adoption	Direct sales to restaurants and
		through a distributor
Case 4	Average technological adoption	Direct sales to restaurants and in
		markets

The collected data has allowed us to create projections for typical farms and to identify the costs, revenues and human resources needs per m².

IMPLEMENTATION OF A FARM PROJECT PRODUCING MICROGREENS

The implementation of a farm producing microgreens can be relatively simple¹. As the production cycle is very short, expansions can be quickly implemented at a relatively low cost. They can also be carried out in phases. One of the important components of microgreen farms is the set-up of ergonomic installations that ease all the activities, from germination to packaging.

The facility surfaces for this kind of production are small, and often cramped, even for operations with a high production volume. In the cases that were analyzed, they are all enterprises with rented spaces of less than 200 m². Furthermore, most studied cases had planned space for future expansions.

The operation's design fluctuates greatly depending on the enterprise and reflects their operation in terms of production and distribution. Cases 3 and 4 are very intensive production farms, with a production method based on more technological units, and they have high *number of production trays / production surface* ratios (10), while a farm with a minimal investment approach (case 1) has a low ratio (1.5). Cases 2 and 3 are in between.

Table 4. Surface allocated to each production activity.

	Production surface (m²)	Production capacity (No. of trays)	Germination surface (m²)	Processing surface (m ²)	Other (m²)
Case 1	40	63	2	4	120 ¹
Case 2	100	194	20	40	
Case 3	76	736	91 ²	76	60 ³
Case 4	20	100	11	9	100 ¹

¹ Space planned for the farm's development, ² Includes a cleaning area, ³ Office area, cafeteria and cold room

¹ For details on the technical aspects, consult the start-up guide for the operation of a farm producing microgreens created by AU/LAB. To consult this guide: http://cretau.ca/wp-content/uploads/2020/04/Guide Micropousses CRETAU 2019 f-1-1.pdf

The initial investments also reflect the level of technology adopted by the farm. The start-up investment, including all the installations and the purchase of basic equipment for the production², varies between \$40,000 for an operation with an average technological adoption level, to almost \$260,000 for an enterprise with a high technological level. The investment cost per tray of microgreens is between \$40 to close to \$437 per production tray.

Table 5. Installation cost of farms producing microgreens

Equipment	Number of modules	Number of trays	Cost (\$/module)	Investment cost (\$/tray)	
Case 1					
	shelves	63		\$110	
Total installation cost: \$7,000					
Case 2					
Modules	15	194	\$3,625	\$280	
Total installation cost: \$54,375					
Case 3					
	2	595	\$25,000	\$437	
Total installation cost: \$260,000					
Case 4					
	shelves	100		\$40	
Total installation cost: \$40,000	•	•	•	•	

The choice of the technology adopted by the enterprise/operation to produce microgreens has a direct impact on the operation's surface (which represents a leasing cost) and on the labour needs (production and sales).

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² Consult the start-up guide for the operation of a farm producing microgreens created by AU/LAB.

REVENUES FROM THE PRODUCTION OF MICROGREENS

Apart from the volume of microgreens produced or the number of trays sold, the main components that influence revenue from the production of microgreens are the local market price and the distribution channel. If the services of a distributor make it possible to sell a large volume of microgreens, this, however, reduces the producers' profit margins (Table 6).

The annual agricultural revenue of the analyzed microgreen producers varies between \$40,000 to close to \$300,000, so around \$300 to \$700 per production tray.

Table 6. Revenues from the production of microgreens.

			Revenues			
	No. of production trays ¹	Sales channel	Annual CA\$	\$/production tray		
Case 1	63	Direct	\$40,000	\$635		
Case 2	135 ²	Direct	\$90,000	\$667		
Case 3	595	Distributor	\$287,000	\$482		
Case 4	100	Direct	\$71,000	\$710		

¹ Number of trays in simultaneous production, ² On a capacity of 194 simultaneous production trays, the operation has only produced 135 in 2019.

WORK TIME NEEDED TO OPERATE A FARM PRODUCING MICROGREENS

The intensity of work needed to operate a microgreens farm is also a key to the success of an operation. In the cases that were analyzed, all enterprises had fewer than three full-time employees.

The work time is distributed in various tasks and differs depending on the sales channel. The sale of living microgreens and bulk sales in markets (cases 2 and 4) reduce the time dedicated to processing activities that include harvesting, cleaning, cutting and packaging of microgreens. Conversely, packaging increases the time dedicated to this task (case 3).

ECONOMIC FACT SHEET – URBAN MICROGREEN FARMS

Table 6. Work time and work intensity on farms producing microgreens.

		% of work time dedicated to various tasks					
	Yearly total of hours	Germination and production	Processing ¹	Commercialization ²	R&D	Hours/ production tray	
Case 1	1,404	55	10	25	10	22	
Case 2	2,780	40	20	30	10	20	
Case 3	6,270	14	66	20		10.5	
Case 4	1,560	70	15	15		16	

¹ Processing includes harvesting, cleaning, cutting and packaging the microgreens. ² Distribution, sales and prospecting to stores, restaurants, etc.

THE KEYS OF SUCCESS FOR PRODUCTION

A farm producing microgreens can be set-up with a small investment and a minimal technological level. Therefore, numerous microgreen producers are established in cities. They produce intensively a high-value product in relation to the surface (or with a high yield per m²).

However, a low start-up investment leads to an increase in the work intensity per tray. Furthermore, it needs a higher production surface which translates into an increase in rental costs.

High technology adoption allows for production intensity both in terms of space and work time. However, a very high production is necessary in order to make the initial investments profitable, which makes it essential to use the services of a distributor to sell production, thus reducing the profit margin per production tray.

ASSESSMENT OF THE ECONOMIC VIABILITY OF A FARM PRODUCING MICROGREENS

The popularity of urban farms producing microgreens is currently based on the ease with which a farm can be started, with a relatively small investment. Furthermore, a microgreens production quickly earns revenue.

In contrast with other types of productions, urban microgreen producers can base their revenue solely on the production of microgreens without investing in non-agricultural activities. In the studied cases, which have all been in existence less than five years, the projects are able to earn profits. They can refund the investments needed for the start-up.

KEY ELEMENTS FOR ECONOMIC VIABILITY

Starting with the numbers from the analyzed cases, we can see that the production of microgreens can quickly create substantial revenues. However, the establishment of numerous microgreens producers makes it more and more difficult to market the production.

The opportunities of selling microgreens remain very focused on restaurants which purchase in small quantities. The development of a market within the population, through direct sales and grocery stores will be vital to allow the growth of microgreen farms. To this end, urban producers have advantages such as being able to sell hyperlocally, having a direct link with the customers and inserting themselves in zero waste grocery stores.

As the production occurs on very small surfaces and can be done in less desirable commercial and industrial spaces such as basements, the constraint of city rental costs is not a major issue.

Although aiming for production automation necessitates important investments, it makes it possible to optimize work time and to share it with other aspects of the enterprise such as the commercialization and the development of the customer base. An urban farm producing microgreens must find the right balance between the adoption of technology (investment) and its market (estimated revenue, opportunities).

Producing high volumes requires efficient sales and distribution, as it increases the risk of losses. Thus, a microgreens producer planning for a high production must explore processing avenues such as the production of dressings, cookies, etc.

Table 7. Assessment of the economic viability of a farm producing microgreens

	Surface (m²)	CA\$	HR¹ operation costs (\$/year)	Rent and electricity costs	Seed costs (\$)	Soil/mat costs	Other declared revenue sources	Project profit or deficit
Case 1	low	\$40,000	\$24,530	\$7,800	\$2,400	\$1,240		\$13,088
Case 2	average	\$90,000	\$48,577	\$13,000	\$7,600	\$10,500		\$10,323
Case 3	high	\$287,000	\$109,560	\$24,000	\$19,995	\$7,242	\$13,000	\$139,200
Case 4	average	\$71,000	\$27,259	\$26,500	\$10,000	\$5,000		\$2,241

Legend: ¹This cost estimate for human resources is based on an hourly wage of \$15/hour (with 16.492% in payroll taxes), which is not necessarily the reality. The profits related to various cases do not consider debt and cash flow, which are essential elements to create a farm's business plan.

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