PolliOne

Pollione - Market Analysis and Growth Strategy

Building Companies on Science

Master in Management/Finance Field Lab

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Prof. Nuno Arantes Oliveira

December 2021

First part of the project describes the analysis carried out to locate the best markets to operate in and the strategies to be adopted, both on the side of competition and on the side of conducting our business. It shows the potential of the market, the countries in which we intend to operate and our positioning with respect to competitors, which leads to the definition of the role we want to play.
While the second part shows our growth strategies and further expansion opportunities by capturing new potential markets.

KEY WORDS

Entrepreneurship;
Venture Capital;
Entrepreneurial Finance;
Business Strategy;
Start-Up;
Agricultural Modernization;
Pollination

IMPORTANT

This work used infrastructure and resources funded by Fundação para a Ciência e a Tecnologia (UID/ECO/00124/2013, UID/ECO/00124/2019 and Social Sciences DataLab, Project 22209), POR Lisboa (LISBOA-01-0145-FEDER-007722 and Social Sciences DataLab, Project 22209) and POR Norte (Social Sciences DataLab, Project 22209).

MARKET


(Meyers 2019)

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THE POLLINATION MARKET

BIGGEST PLAYERS are focusing on multiple businesses[1]

AGRICULTURAL DRONES IN THE US

which might sooner or later invest in pollination[2]

PRECISIONHAWK

SKYCATCH

sentera

DroneDeploy

[1, 2,] (PitchBook Data, Inc. 2021)
*More details in the Appendix

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Market Analysis

OUR NICHE MARKET

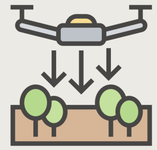
REGENERATIVE AGRICULTURAL PRACTICES GAIN STEAM

- Land management practices improve soil health, fertility, water retention, and plant management[1].

LABOR SHORTAGE AND PRODUCTION CYCLES

- Highlights the need for automation.
- Smart farming innovations reduces need for human labor[2].

FRUIT CYCLICITY PUTS POLLINATION AT RISK



- The growth in cultivation of high-value, pollination-dependent crops is outpacing growth in the global stock of managed honeybees[3].

[1, 2, 3](PitchBook Data, Inc. 2021)

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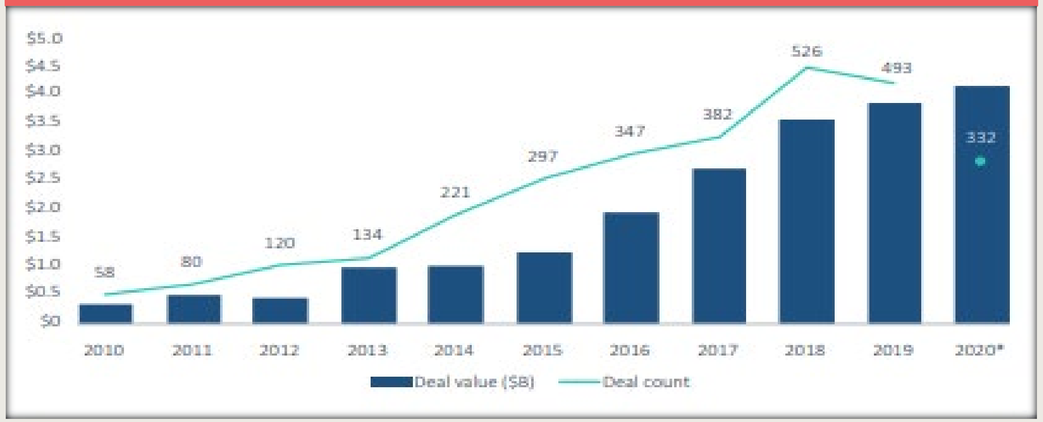
THE MARKET POTENTIAL

The global pollination market was valued **$1.51 BILLION** in 2019[1].

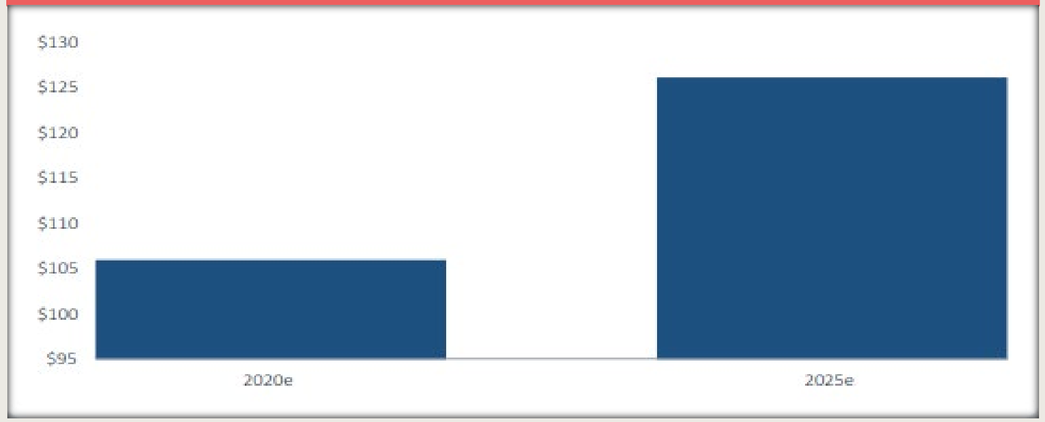
- Every season, pollination from honeybees, native bees, and flies deliver billions of dollars (U.S.) in economic value[2].
  - Between **$235** and **$577 billion** (U.S.) worth of annual global food production relies on their contribution[3].

ADVANCED FARM EQUIPMENT VC DEAL ACTIVITY – Q3 2020



- Agtech venture capital funding has climbed by 32.7% since 2010, to $4.1 billion in 2019.
- In the first three quarters of 2020, deal values totaled $4.2 billion across 332 deals, 7.8% above the $3.9 billion raised in the entirety of 2019.

FARM MACHINERY MARKET SIZE ($B)



- Based on global revenues of agricultural equipment manufacturers, the total farm equipment market is **$106 billion** in **2020**[4]**.**
- Expanding at a CAGR of **3.5%** to reach **$126.1 billion** by **2025**[5].

(Knowledge Sourcing Intelligence LLP 2021)[1]
(Bayer AG 2019)[2, 3]
(PitchBook Data, Inc. 2021)[4, 5]
Source Graphs: (PitchBook Data, Inc. 2021)
*as of September 2020

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THE APPLE AND PEAR MARKET

Following characteristics reveal an ideal pollination fit for apple and pear fruits.

FRUIT	POLLINATION TYPE	POLLINATION RESPONSIVENESS (as % of yield)[5]	POSITIONING	EU PRODUCTION in 2020 (in 1000 tons)
 Apple (Malus domestica)[1]	• No self-fertilization • Not wind-pollinated • Relies heavily on bees[3]	**100%**	• Open flower • Stigma easily reachable • Flower facing outward • Flowers less blocked by leaves or branches[6]	**11 330**[8]
 Pear (Pyrus communis)[2]	• No self-fertilization • Not wind-pollinated • Relies heavily on bees[4]	**50-100%**	• Open flower • Stigma easily reachable • Flower facing outward • Flowers less blocked by leaves or branches[7]	**2 328**[9]

Pictures: (Rawpixel n.d.)
(Britannica 2021)[1, 2]

[3, 6](Sheffield, Ngo and Azzu 2016)
[4, 7](Sharifani 1997)
[5](Keogh, Robinson, & Mullins, 2010)
[8](European Commission 2021)
[9](European Commission 2021)

Our Strategy

MAIN TARGET MARKETS

Main target markets for Apple and Pears located in Europe.

Spain

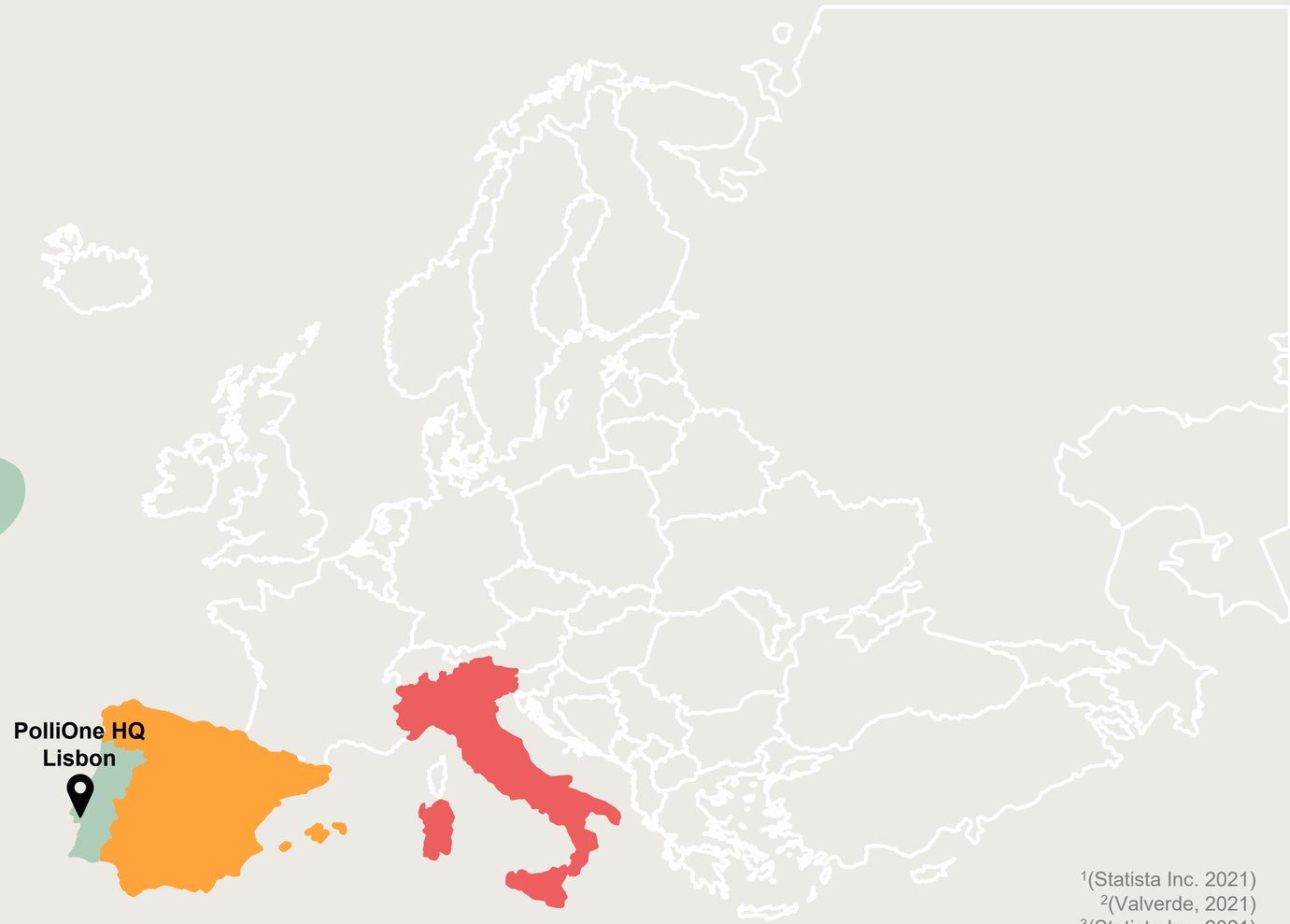
8.3$ Billion
of Spanish global fruit exports[1]

Portugal

800$ Million
of Portuguese fruit exports[2]

Italy

3.7€ Billion
of italian fruit exports[3]



[1](Statista Inc. 2021)
[2](Valverde, 2021)
[3](Statista Inc. 2021)

Our Strategy

MAIN TARGET MARKETS

Main target markets for Apple and Pears located in Europe.

Spain

8.3$ Billion
of Spanish global fruit exports[1]

- Main fruit & vegetables producer of the EU & the 5th worldwide
- In 2017 production amounted to EUR 14 500 million
- 50% coming from crop production
- Sector is **continuously increasing** its economic value[2]

Portugal

800$ Million
of Portuguese fruit exports[3]

- Portuguese fruit exports **increased 162 percent** according to Trade Data Monitor (TDM)
- Portugal's goal is to **increase** its fruit production and exports
- Rocha pears – one of the best variety worldwide[4]

Italy

3.7€ Billion
of italian fruit exports[5]

- Italy is the **fifth** country in the world for pear production (429,290 tons)
- **Sixth** for apple production (2,303,690 tons)
- Big consortia we can partner with[6]

[1](Statista Inc. 2021)
[2](Organisation for economic co-operation and development 2018)
[3, 4](Valverde, 2021)
[5, 6](Miserius & Dr. Behr, 2021)

COMPETITORS

Competitor Analysis

CURRENT COMPETITOR OFFERS

Farmers are renting bee colonies for pollination, relying on generical farm suppliers.

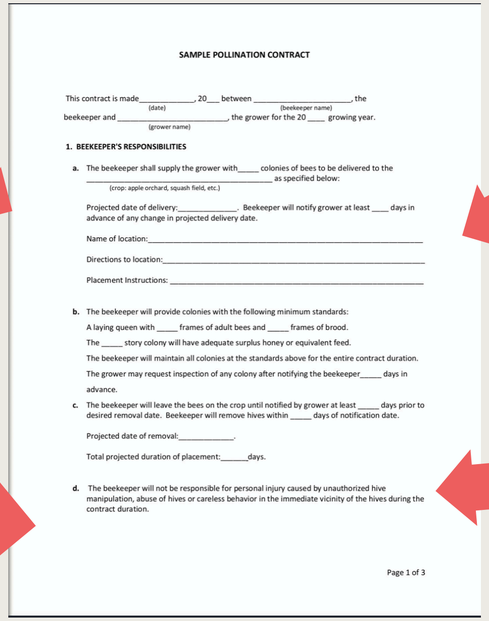
Bee Pollination: expensive & not sustainable[1]

Boxes with bees are provided and placed on fields

After pollination season, bees die

Pollination agreement[2]: complex & expensive

Needed to receive strong colonies



SAMPLE POLLINATION CONTRACT

This contract is made_____, 20___ between _____, the
(date) (beekeeper name)
beekeeper and _____, the grower for the 20____ growing year.
(grower name)

1. BEEKEEPER'S RESPONSIBILITIES

a. The beekeeper shall supply the grower with_____ colonies of bees to be delivered to the _____ as specified below:
(crop: apple orchard, squash field, etc.)

Projected date of delivery:_____. Beekeeper will notify grower at least ____ days in advance of any change in projected delivery date.

Name of location:_____

Directions to location:_____

Placement Instructions: _____

b. The beekeeper will provide colonies with the following minimum standards:
A laying queen with _____ frames of adult bees and _____ frames of brood.
The _____ story colony will have adequate surplus honey or equivalent feed.
The beekeeper will maintain all colonies at the standards above for the entire contract duration.
The grower may request inspection of any colony after notifying the beekeeper_____ days in advance.

c. The beekeeper will leave the bees on the crop until notified by grower at least _____ days prior to desired removal date. Beekeeper will remove hives within _____ days of notification date.

Projected date of removal:_____.

Total projected duration of placement:_____days.

d. The beekeeper will not be responsible for personal injury caused by unauthorized hive manipulation, abuse of hives or careless behavior in the immediate vicinity of the hives during the contract duration.

Page 1 of 3

Includes strength of the colonies and agreement's duration

The grower agrees to provide a suitable place to locate the hives and not to apply pesticides

Strict payment agreements depending on colony

Information retrieved from Interviews with Visionagro
[1](Silveira 2021)
[2](Guset User 2015)

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COMPETITIVE LANDSCAPE OF INNOVATORS

Indirect Competitors

AGDRONE AND AGROBOT IN THE EU[1]

Valuation: $ 29,28 M[2] ←

Hummingbird Technologies

Valuation: $ 97,69 M[3] ←

DELAIR
AERIAL INTELLIGENCE

Valuation: n/a ←

AERO41

Direct Competitors

AGTECH POLLINATION START-UPS[4]

edete
Precision Technologies for Agriculture

HARVESTX

DROPCOPTER

Too small for valuation

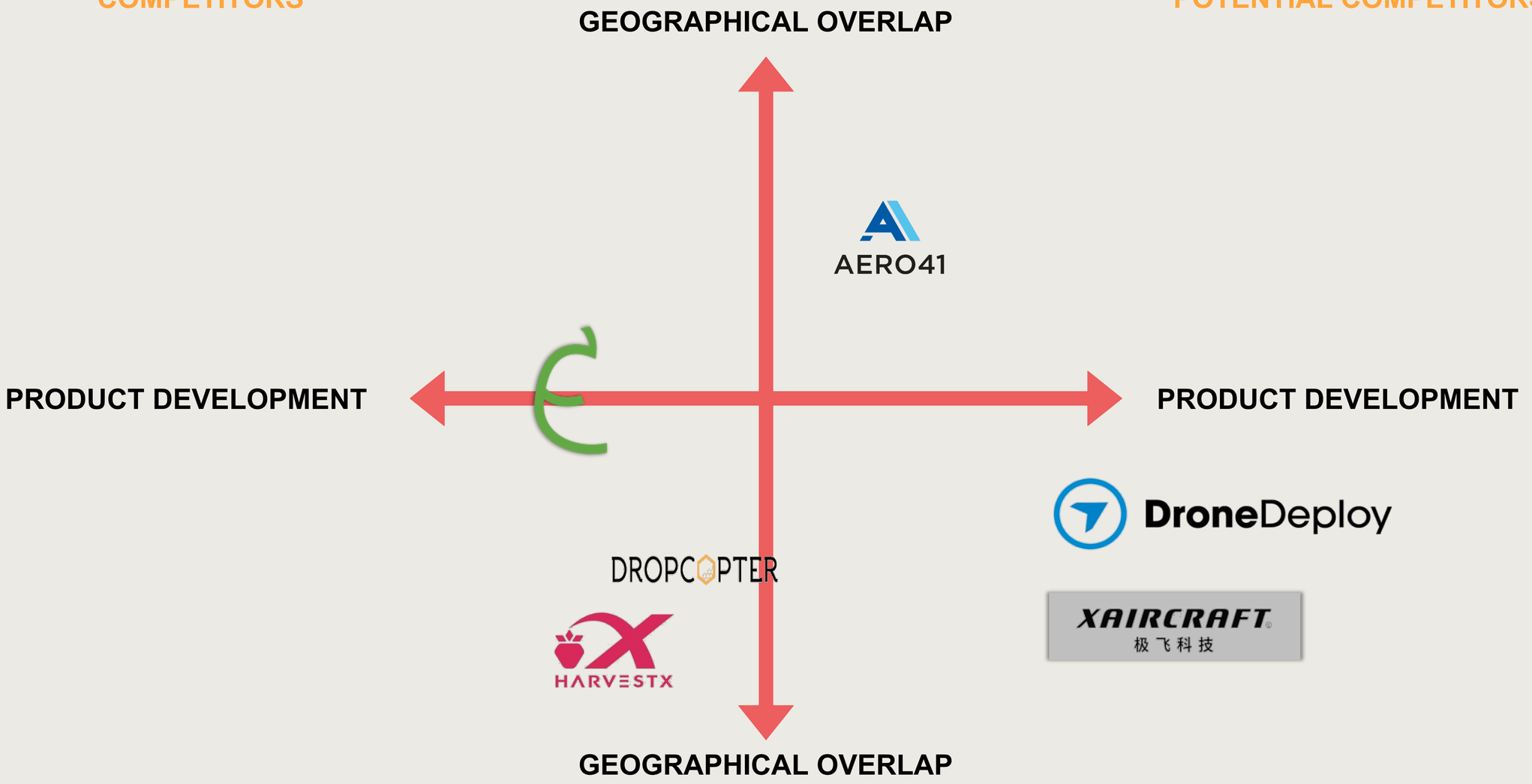
[1, 2, 3, 4] (PitchBook Data, Inc. 2021)
*More details in the appendix

Competitor Analysis

THIS REVEALS A LARGE OPPORTUNITY

COMPETITORS

POTENTIAL COMPETITORS



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COMPETITORS OBJECTIVES

Direct Competitors

AGTECH POLLINATION START-UPS

edete
Precision Technologies for Agriculture

- Pollen-harvesting system for the collection of flowers
- Separation of pollen from anthers
- Long-term storage of pollen stock
- Autonomic system self-positioning at an optimal position to cover any open flower[1]

HARVESTX

- Company's technology recognizes flowers and fruits
- Using a depth camera and an image processing algorithm
- Thereby helps with pollination and harvesting[2]

DROPCOPTER

- The company's system provides aerial pollination and dry material crop dusting
- Helps in spreading any granular or powdered material with tactical accuracy
- Enabling farmers to pollinate orchards to increase crop yield[3]

Even though located in the US

[1](Edete Precision Technologies for Agriculture n.d.)
[2](HarvestX Inc. n.d.)
[3](Dropcopter n.d.)
*More details in the appendix

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COMPETITORS LIMITATIONS

Direct Competitors

AGTECH POLLINATION START-UPS

Drawbacks

edete
Precision Technologies for Agriculture

- Technological Set-Up
- Heavy machinery must move through the field
- Harming soil and vegetation
- Very time intensive

HARVESTX

- The company's technology is stationed and has a fixed set-up
- No agile and adaptable movement possible yet
- Research and development service

DROPCOPTER

- Spreading any granular or powdered material by dispensing it over the tree
- Inaccuracy in hits
- Efficiency failure as pollen may not hit the stigma
- Costly as more pollen grains required

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OUR COMPETITIVE EDGE

1 Innovative Strategy

&

2 Technology Based Competitive Strategy

GO-TO-MARKET STRATEGY

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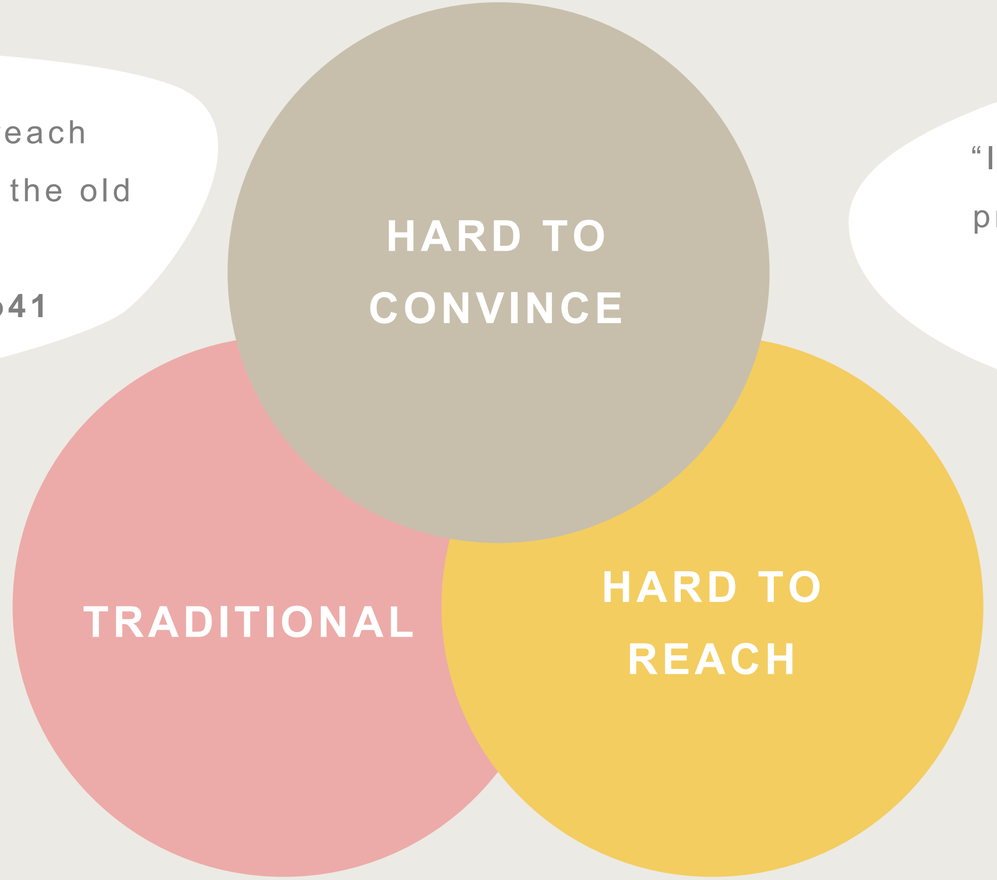
To Recap

CHALLENGES WE KNOW ABOUT FARMERS

"In the beginning it's hard to reach farmers, you really need to fight the old mentality."
- Quentin Collet, CTO Aero41



"I would be interested, only if you can proof this solution is more efficient or saves me money."
- CEO, Visionagro

"We have always sticked to traditional pollination techniques."
- Ricardo Daniel Mendes, Frutalvor

"... they have significant cost, 560€ / hectare."
- Isabel Fonseca, Frutalmente

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Marketing

REACHING OUR CUSTOMERS

FOCUS

CONSORTIA

Melinda® D.O.P. MELA VAL DI NON

ROCHA DO OESTE PORTUGAL

CONSEJO REGULADOR DENOMINACIÓN DE ORIGEN MANZANA REINETA DEL BIERZO

EARLY ADOPTERS

TECH-SAVVY FARMERS

CHANNEL

DIRECT APPROACH
Face-to-Face/Telephone

FARMING JOURNALS & WEBSITES

The Olive Press

Revista agrotejo

FARM EXPOSITION

AGRITECHNICA® THE WORLD'S NO.

Expodrónica

altice FORUM braga

CTR CENTRAL AGRICULTURAL TRADE FAIR

WORD-OF-MOUTH

BENEFITS

- BREAK THE NORM
- FASTER ADOPTION
- RAPID EXPANSION
- NETWORK EFFECT

Growth Strategy

GO-TO-MARKET MILESTONES

2022
Set up our business and start **small-scale trials**

2023
Start to engage with the first customers by tackling agricultural **trade fairs**

2024
Start to increase number of customers and **strengthen our customer relationships** through developed sales process

2025
Conquer more space, and follow new trends by offering different fruit varieties

2026
Plan to become profitable, scaling up and developing key partnerships

Potential future partner:
The World Apple & Pear Association[1]

[1] (WAPA Association n.d.)

EXPANSION OPPORTUNITIES

Similar characteristics to apples and pears in terms of pollination.
Represent a **growth opportunity** for our company.

ALMOND
- Not wind-pollinated
- Bloom for a 3-weeks period yearly[4]

KIWI
- No nectar to attract insects
- Number of seeds depend on amount of pollen[5]

PUMPKIN
- Requires large amount of pollen
- Fruit quality enhanced by intensive pollinator activity[6]

SPAIN

2ND biggest pumpkin producer in the EU[2].
Biggest almond producer in the EU[3].

ITALY

2ND biggest kiwi producer worldwide[1].

(Statista Inc., 2021)[1]
(European Commission, 2020)[2]
(Medina, 2021)[3]

[4](Goldowitz Jimenez, 2020)
[5](Science Learning Hub – Pokapū Akoranga Pūtaiao, 2014)
[6](Surcica, 2014)

BIBLIOGRAPHY

PolliOne

MARKET & COMPETITOR ANALYSIS

Bayer AG. 2019. Forbes. 10 14. Accessed 10 16, 2021. https://www.forbes.com/sites/bayer/2019/10/14/the-value-of-pollinators-to-the-ecosystem-and-our-economy/?sh=76f0b36a7a1d.

Britannica, The Editors of Encyclopaedia. 2021. Britannica. 09 24. Accessed 12 01, 2021. https://www.britannica.com/plant/pear.

CBI Ministry of Foreign Affairs. 2021. CBI . 09 28. Accessed 10 15, 2021. https://www.cbi.eu/market-information/fresh-fruit-vegetables/apples/market-potential.

Dropcopter. n.d. Dropcopter. Accessed 12 07, 2021. https://www.dropcopter.com.

Edete Precision Technologies for Agriculture. n.d. Edete. Accessed 12 07, 2021. https://www.edetepta.com.

European Commission. 2021. The Apple Market in the EU - Production, areas and yields. European Commission.

European Commission. 2021. The Pear Market in the EU - Production, yields and areas. European Commission.

Guset User. 2015. "FLIPHTML5." 08 18. Accessed 10 15, 2021. https://fliphtml5.com/dnki/efwq/basic.

HarvestX Inc. n.d. HarvestX. Accessed 12 07, 2021. https://harvestx.jp/en/.

Keogh, Robert C., Anthony PW. Robinson, and Ian J Mullins. 2010. Pollination Aware - The Real Value of Pollination in Australia. Australia: Rural Industries Research and Development Corporation.

Knowledge Sourcing Intelligence LLP. 2021. Knowledge Sourcing. 07. Accessed 10 16, 2021. https://www.knowledge-sourcing.com/report/global-pollination-market.

Meyers, Dan. 2019. Unsplash. 07 19. Accessed 10 16, 2021. https://unsplash.com/photos/0AgtPoAARtE.

Miserius, Madlen, and Hans-Christoph Dr. Behr. 2021. Fruit Logistica - European Statistics Handbook. Berlin: Messer Berlin GmbH.

Organisation for economic co-operation and development. 2018. OECD Fruit and Vegetables Scheme. Seville: OECD.

PitchBook Data, Inc. 2021. PitchBook. 12. Accessed 12 05, 2021. https://pitchbook.com.

Rawpixel. n.d. rawpixel. Accessed 12 01, 2021. https://www.rawpixel.com/services/licenses.

Sharifani, M. Mehdi. 1997. Pollination, Fruit Set and Identification Studies in Pear. South Australia: The University of Adelaide .

Sheffield, Cory S., Hien T. Ngo, and Nadine Azzu. 2016. A Manual on Apple Pollination. Rome: Food and Agriculture Organization of the United Nations.

Silveira, Nuno, interview by Maxim Herbosch. 2021. Pollination Interview (10 21).

Statista Inc. 2021. Statista. 02. Accessed 12 05, 2021. https://www.statista.com/statistics/812434/production-volume-of-leading-kiwi-producing-countries/.

Statista, Inc. 2021. Statista. Accessed 11 20, 2021. https://www.statista.com/statistics/1198581/exports-value-fruits-from-spain-by-destination/.

—. 2020. Statista. 07. Accessed 11 20, 2021. https://www.statista.com/statistics/1023106/value-of-fruit-and-vegetables-products-exported-from-italy/.

Valverde, Carmen. 2021. "Portuguese Fruit Sector Aims to Increase Investments Efficiency and Exports." Madrid.

Bibliography

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GO-TO-MARKET STRATEGY

Edo, Guillermo D. , interview by Maxim Herbosch. 2021. Interview Business Model (10 18).

European Commission. 2020. Eurostat. 10 30. Accessed 12 05, 2021. https://ec.europa.eu/eurostat/web/products-eurostat-news/-/edn-20201030-2.

Fonseca, Isabel, interview by Alica Ulrich. 2021. Interview Pollination Process (11 28).

Goldowitz Jimenez, Ilana. 2020. Gardening - Know How. 03 09. Accessed 11 15, 2021. https://www.gardeningknowhow.com/edible/nut-trees/almonds/how-are-almond-trees-pollinated.htm.

Medina, Arantxa. 2021. Tree Nuts Annual. Agriculture, Madird: United States Department of Agriculture - Foreign Agricultural Service.

Mendes, Ricardo Daniel, interview by Alica Ulrich. 2021. Pollination Interview (12 07).

Quentin, Collet, interview by Maxim Herbosch. 2021. Interview Business Model (10 15).

Science Learning Hub – Pokapū Akoranga Pūtaiao. 2014. Science Learning Hub. 02 02. Accessed 11 15, 2021. https://www.sciencelearn.org.nz/resources/99-pollinating-kiwifruit.

Statista Inc. 2021. Statista. 02. Accessed 12 05, 2021. https://www.statista.com/statistics/812434/production-volume-of-leading-kiwi-producing-countries/.

Surcica, Alex. 2014. PennState Extension. 02 28. Accessed 11 15, 2021. https://extension.psu.edu/pumpkin-pollinators.

WAPA Association. n.d. The World Apple and Pear Association . Accessed 12 06, 2021. http://www.wapa-association.org/asp/index.asp.

APPENDIX

Competitor Analysis

BIGGEST PLAYERS ARE FOCUSING ON MULTIPLE BUSINESSES - I

Company	Overview	VC Raised	Only Ag Focused	Deal Type	HQ
XAIRCRAFT 极飞科技	Developer of Smart Agriculture Solutions including ag. drones and Unmanned Ground Vehicles	$246.2 M	√	Late-Stage	
CLEARPATH ROBOTICS™	Custom Robot Engineering Services	$82 M	×	Late-Stage	
PERCEPTO	Harnessing robotics for autonomous inspection	$64.2 M	×	Late-Stage	
FJDynamics	Robotics company focusing on automation, digitalization and green energy	$60.9 M	×	Early-Stage	
BLUE OCEAN ROBOTICS	Develop, produce and sell professional service robots	$57 M	×	Late-Stage	

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BIGGEST PLAYERS ARE FOCUSING ON MULTIPLE BUSINESSES - II

Company	Overview	VC Raised	Only Ag Focused	Deal Type	HQ
SOFT ROBOTICS	Designing and building soft robotic automation systems that can grasp and manipulate items of varying size, shape, and weight	$54.3 M	×	Late-Stage	
PLUS ONE ROBOTICS	Develops computer vision software to enable robotic automation	$43.6 M	×	Late-Stage	
HARVEST AUTOMATION	Develops robots enabling smarter production for growers by providing significant gains in productivity & efficiency	$33.6 M	√	Late-Stage	
TERRACLEAR	End-to-end solution for automating rock clearance	$31.6 M	√	Early-Stage	
ecorobotix	Provider of AI-based ultra-high precision farming solutions	$28.4 M	√	Late-Stage	

FULL PRESENTATION

NOVA SCHOOL OF BUSINESS & ECONOMICS

PolliOne

The One and Only Pollination

Building Companies on Science

Masters in Management Field Lab

Andrea Epis | 43297

Alessandro Ferioli | 44502

Maxim Herbosch | 44683

Alica Katherina Petra Ursula Ulrich | 44246

Prof. Nuno Arantes Oliveira

December 2021

EXECUTIVE SUMMARY

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Bees are facing **increasing challenges** such as habitat loss, pesticides, droughts and climate change. This also has major economic impacts, as a large amount of the EU's annual agricultural output is directly attributed to insect pollination.

The **pollination industry** shows alternative pollination methods being costly and time consuming. They may harm the soil and environment they are operating in. Thus, they do not represent ideal pollination solutions.

PolliOne focuses on **three innovative pillars**, revolutionizing the pollination process **for open field farmers**. With the help of our drones, pollen dispersion by soap bubbles and a subscription-based business model.

Together with our **suppliers** we ensure an optimal output of our innovative pollination process by providing the highest quality of drones, pollen grains, the camera and the 3D printed dispersion machine.

By continuous investments in our **R&D** strategy, we improve the success of our dispersion machine and our AI Technology. Furthermore, direct feedback from customers will always be integrated.

Through our **horizontal growth strategy**, we ensure further expansion opportunities by capturing new potential markets. This includes expanding to other types of fruits, growing in other markets in Europe.

In order to be profitable, we need to be funded in the first years of operation. Then, our financial model is predicted to **be profitable** by the year 2026. By then we want the company to fully operate.

KEY WORDS

UAV;
Agriculture;
Pollination;
AI Technology;
Subscription Based Business Model

IMPORTANT

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(Pacharkar 2021)

THE CHALLENGE

DO YOU KNOW THIS LITTLE CREATURE?

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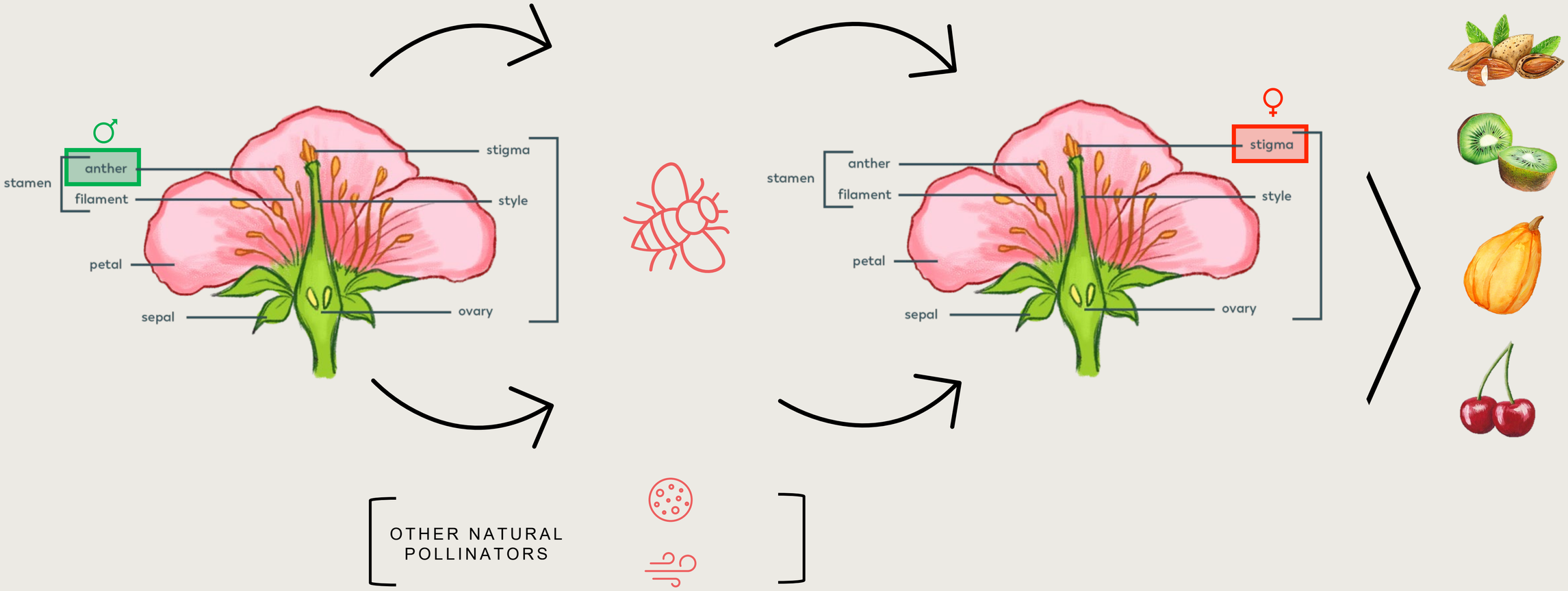
The Pollination Process

BEES, THE GREATEST POLLINATORS



(Captain Planet Foundation 2020)

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BEES ARE IN TROUBLE

25% LESS
Colonies-per-hectare[1]

HIGHER
Winter die-off rates
commonly around 10%
currently around 35%[2]

ONE out of **TEN**
Bee & butterfly species threatened with **extinction** in Europe[5]

1/3rd bee and butterfly populations are declining[3]

DECLINE in numbers and diversity of pollinator[4]

LIST OF HAZARDS[6]

- Pesticides
- Nutrition deficit
- Drought
- Air pollution
- Habitat destruction
- Climate change

(Dids 2021)

[1, 2] (Greenpeace n.d.)
[3, 4, 5] (European Parliament 2021)
[6] (European Parliament 2021)

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ECONOMIC IMPACT

4 out of 5

Crops and wild flowers in the EU depend, at least to some extend, on insect pollination[1]

About 15€ Billion

of the EU's annual agricultural output is directly attributed to insect pollination[2]

>160$ Billion

potential annual net loss in economic welfare to crop consumers and producers across the world[3]

WILD AND DOMESTICATED POLLINATORS ARE VITAL FOR...

Food Security

Biodiversity

Agriculture Yields[4]

[1, 2, 3, 4](European Parliament 2021)

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WHY DO CURRENT SOLUTIONS FAIL?

POLLINATION	PLAYERS	CHALLENGES
 HAND	✕	INEFFICIENT TIME CONSUMING[1]
 MACHINE	edete Precision Technologies for Agriculture HARVESTX	LIMITED COSTLY INEFFICIENT[2]

[1, 2](Yang and Miyako 2020)

HAVE YOU MET THE BEE OF THE 21ST CENTURY?

(Rie 2017)

WHERE DO WE COME IN?

We are…

PolliOne

The One and Only Pollination

(Dress 2019)

PolliOne

The One and Only Pollination

PolliOne is a smart farming start-up based in Lisbon, Portugal

We are providing an **all-around service** for pollination

By this we not only secure a substantial harvest but also a sustainable solution

THREE PILLARS OF INNOVATION

(Gold 2016)

DRONES

Autonomous land mapping through AI technology

NEW POLLINATION METHOD

Unique technique of bubble liquid & pollen grains

BUSINESS MODEL

Clients complete a **subscription-based** contract

MARKET

(Meyers 2019)

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THE POLLINATION MARKET

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AGRICULTURAL DRONES IN THE US

which might sooner or later invest in pollination[2]

PRECISIONHAWK

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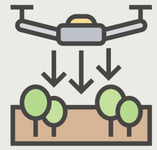
FRUIT CYCLICITY PUTS POLLINATION AT RISK



- The growth in cultivation of high-value, pollination-dependent crops is outpacing growth in the global stock of managed honeybees[3]

[1, 2, 3](PitchBook Data, Inc. 2021)

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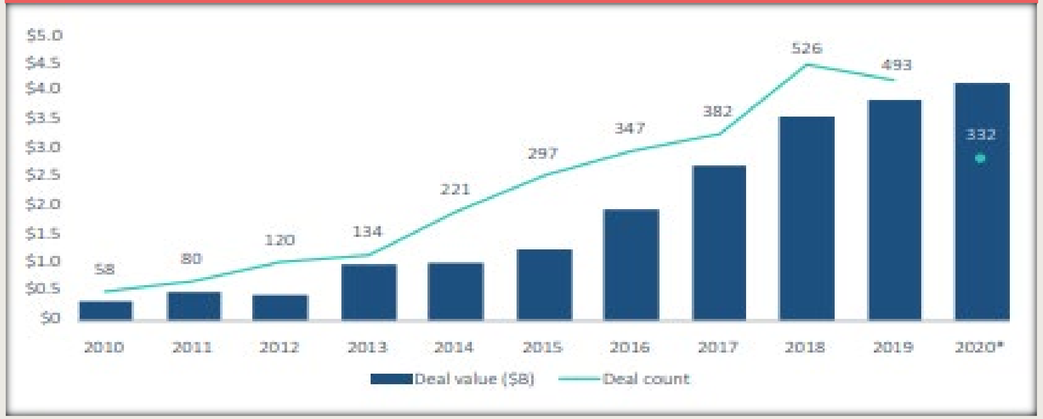
THE MARKET POTENTIAL

The global pollination market was valued **$1.51 BILLION** in 2019[1]

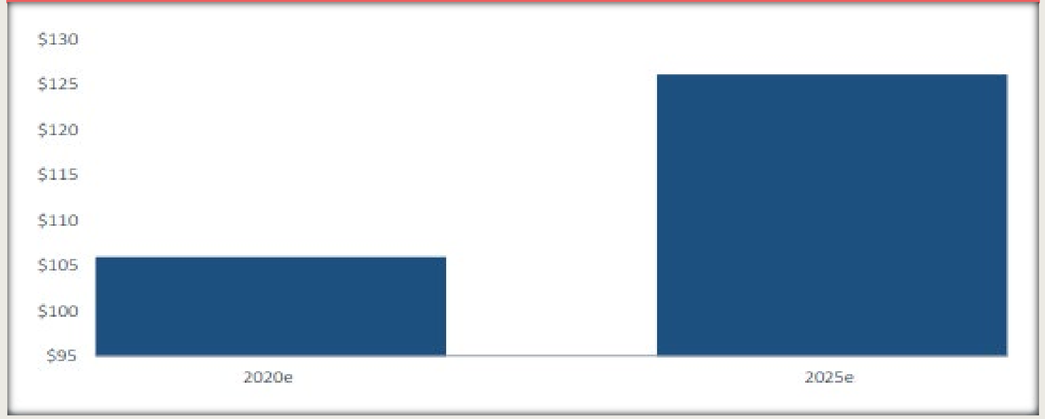
- Every season, pollination from honeybees, native bees, and flies deliver billions of dollars (U.S.) in economic value[2]
  - Between **$235** and **$577 billion** (U.S.) worth of annual global food production relies on their contribution[3]

ADVANCED FARM EQUIPMENT VC DEAL ACTIVITY – Q3 2020



- Agtech venture capital funding has climbed by 32.7% since 2010, to $4.1 billion in 2019
- In the first three quarters of 2020, deal values totaled $4.2 billion across 332 deals, 7.8% above the $3.9 billion raised in the entirety of 2019

FARM MACHINERY MARKET SIZE ($B)



- Based on global revenues of agricultural equipment manufacturers, the total farm equipment market is **$106 billion** in **2020**[4]
- Expand at a CAGR of **3.5%** to reach **$126.1 billion** by **2025**[5]

(Knowledge Sourcing Intelligence LLP 2021)[1]
(Bayer AG 2019)[2, 3]
(PitchBook Data, Inc. 2021)[4, 5]
Source Graphs: (PitchBook Data, Inc. 2021)
*as of September 2020

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THE APPLE AND PEAR MARKET

The following characteristics reveal an ideal pollination fit for apple and pear fruits

FRUIT	POLLINATION TYPE	POLLINATION RESPONSIVENESS (as % of yield)[5]	POSITIONING	EU PRODUCTION in 2020 (in 1000 tons)
 Apple (Malus domestica)[1]	• No self-fertilization • Not wind-pollinated • Relies heavily on bees[3]	**100%**	• Open flower • Stigma easily reachable • Flower facing outward • Flowers less blocked by leaves or branches[6]	**11 330**[8]
 Pear (Pyrus communis)[2]	• No self-fertilization • Not wind-pollinated • Relies heavily on bees[4]	**50-100%**	• Open flower • Stigma easily reachable • Flower facing outward • Flowers less blocked by leaves or branches[7]	**2 328**[9]

Pictures: (Rawpixel n.d.)
(Britannica 2021)[1, 2]

[3, 6](Sheffield, Ngo and Azzu 2016)
[4, 7](Sharifani 1997)
[5](Keogh, Robinson, & Mullins, 2010)
[8](European Commission 2021)
[9](European Commission 2021)

Our Strategy

MAIN TARGET MARKETS

Main target markets for Apple and Pears located in Europe

Spain

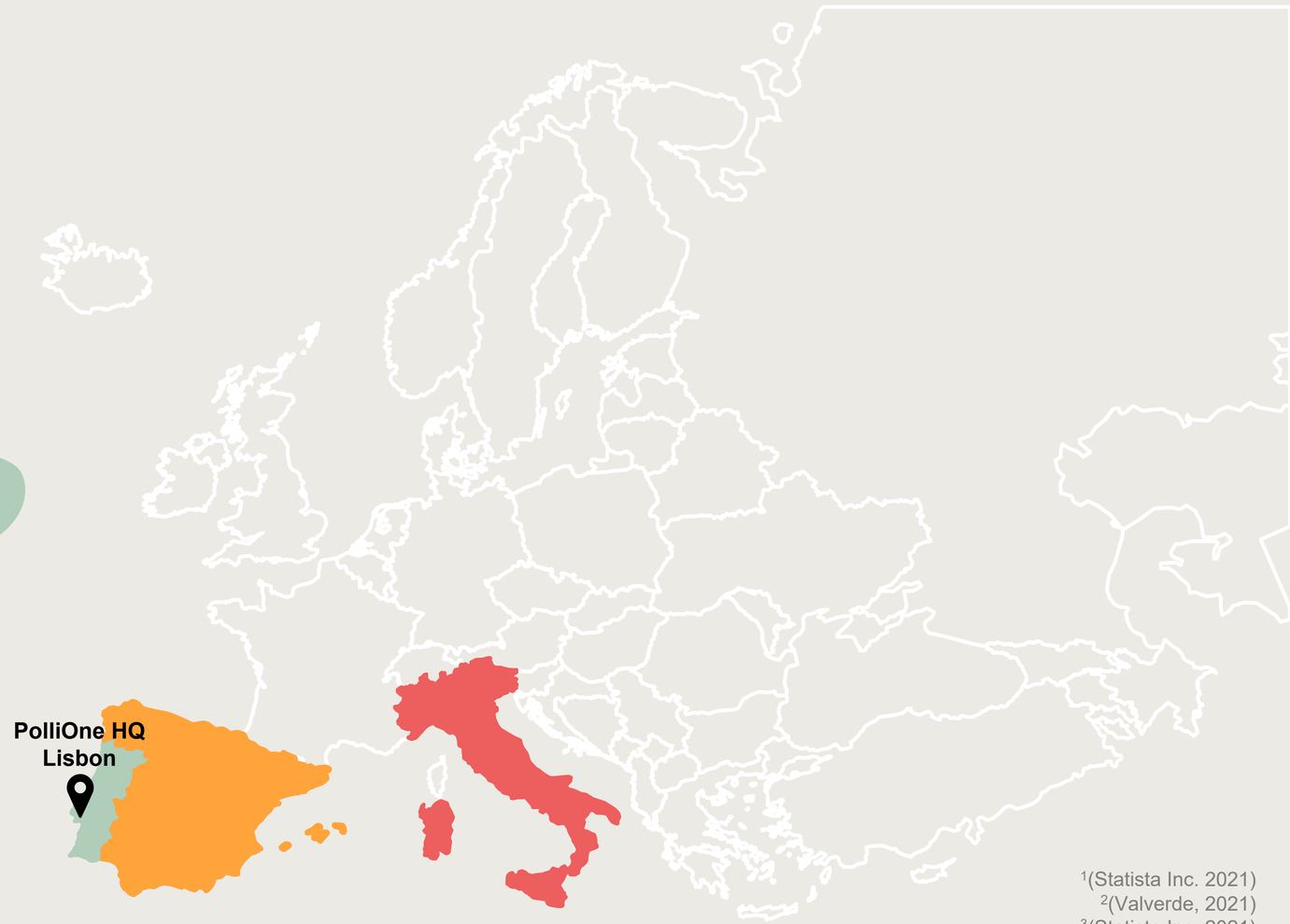
8.3$ Billion
of Spanish global fruit exports[1]

Portugal

800$ Million
of Portuguese fruit exports[2]

Italy

3.7€ Billion
of Italian fruit exports[3]



[1](Statista Inc. 2021)
[2](Valverde, 2021)
[3](Statista Inc. 2021)

Our Strategy

MAIN TARGET MARKETS

Main target markets for Apple and Pears located in Europe

Spain

8.3$ Billion
of Spanish global fruit exports[1]

- Main fruit & vegetables producer of the EU & the 5th worldwide
- In 2017 production amounted to EUR 14 500 million
- 50% coming from crop production
- Sector is **continuously increasing** its economic value[2]

Portugal

800$ Million
of Portuguese fruit exports[3]

- Portuguese fruit exports **increased 162 percent** according to Trade Data Monitor (TDM)
- Portugal's goal is to **increase** its fruit production and exports
- Rocha pears – one of the best variety worldwide[4]

Italy

3.7€ Billion
of Italian fruit exports[5]

- Italy is the **fifth** country in the world for pear production (429,290 tons)
- **Sixth** for apple production (2,303,690 tons)
- Big consortia we can partner with[6]

[1](Statista Inc. 2021)
[2](Organisation for economic co-operation and development 2018)
[3, 4](Valverde, 2021)
[5, 6](Miserius & Dr. Behr, 2021)

COMPETITORS

Competitor Analysis

CURRENT COMPETITOR OFFERS

Farmers are buying bee colonies for pollination, relying on generical farm suppliers

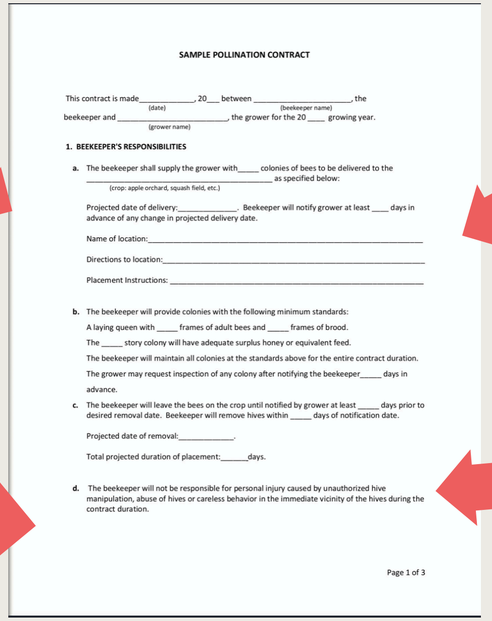
Bee Pollination: expensive & not sustainable[1]

Boxes with bees are provided and placed on fields

After pollination season, bees die

Pollination agreement[2]: complex & expensive

Needed to receive strong colonies



SAMPLE POLLINATION CONTRACT

This contract is made _____ (date), 20___ between _____ (beekeeper name), the beekeeper and _____ (grower name), the grower for the 20____ growing year.

1. BEEKEEPER'S RESPONSIBILITIES

a. The beekeeper shall supply the grower with_____ colonies of bees to be delivered to the _____ (crop: apple orchard, squash field, etc.) as specified below:

Projected date of delivery:_____. Beekeeper will notify grower at least ____ days in advance of any change in projected delivery date.

Name of location:_____

Directions to location:_____

Placement Instructions: _____

b. The beekeeper will provide colonies with the following minimum standards:

A laying queen with _____ frames of adult bees and _____ frames of brood.

The _____ story colony will have adequate surplus honey or equivalent feed.

The beekeeper will maintain all colonies at the standards above for the entire contract duration.

The grower may request inspection of any colony after notifying the beekeeper_____ days in advance.

c. The beekeeper will leave the bees on the crop until notified by grower at least _____ days prior to desired removal date. Beekeeper will remove hives within _____ days of notification date.

Projected date of removal:_____.

Total projected duration of placement:_____days.

d. The beekeeper will not be responsible for personal injury caused by unauthorized hive manipulation, abuse of hives or careless behavior in the immediate vicinity of the hives during the contract duration.

Page 1 of 3

Includes strength of the colonies and agreement's duration

The grower agrees to provide a suitable place to locate the hives and not to apply pesticides

Strict payment agreements depending on colony

Information retrieved from Interviews with Visionagro

[1](Silveira 2021)

[2](Guset User 2015)

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COMPETITIVE LANDSCAPE OF INNOVATORS

Indirect Competitors

AGDRONE AND AGROBOT IN THE EU[1]

Valuation: $ 29,28 M[2] ←

Hummingbird Technologies

Valuation: $ 97,69 M[3] ←

DELAIR
AERIAL INTELLIGENCE

Valuation: n/a ←

AERO41

Direct Competitors

AGTECH POLLINATION START-UPS[4]

edete
Precision Technologies for Agriculture

HARVESTX

DROPCOPTER

Too small for valuation

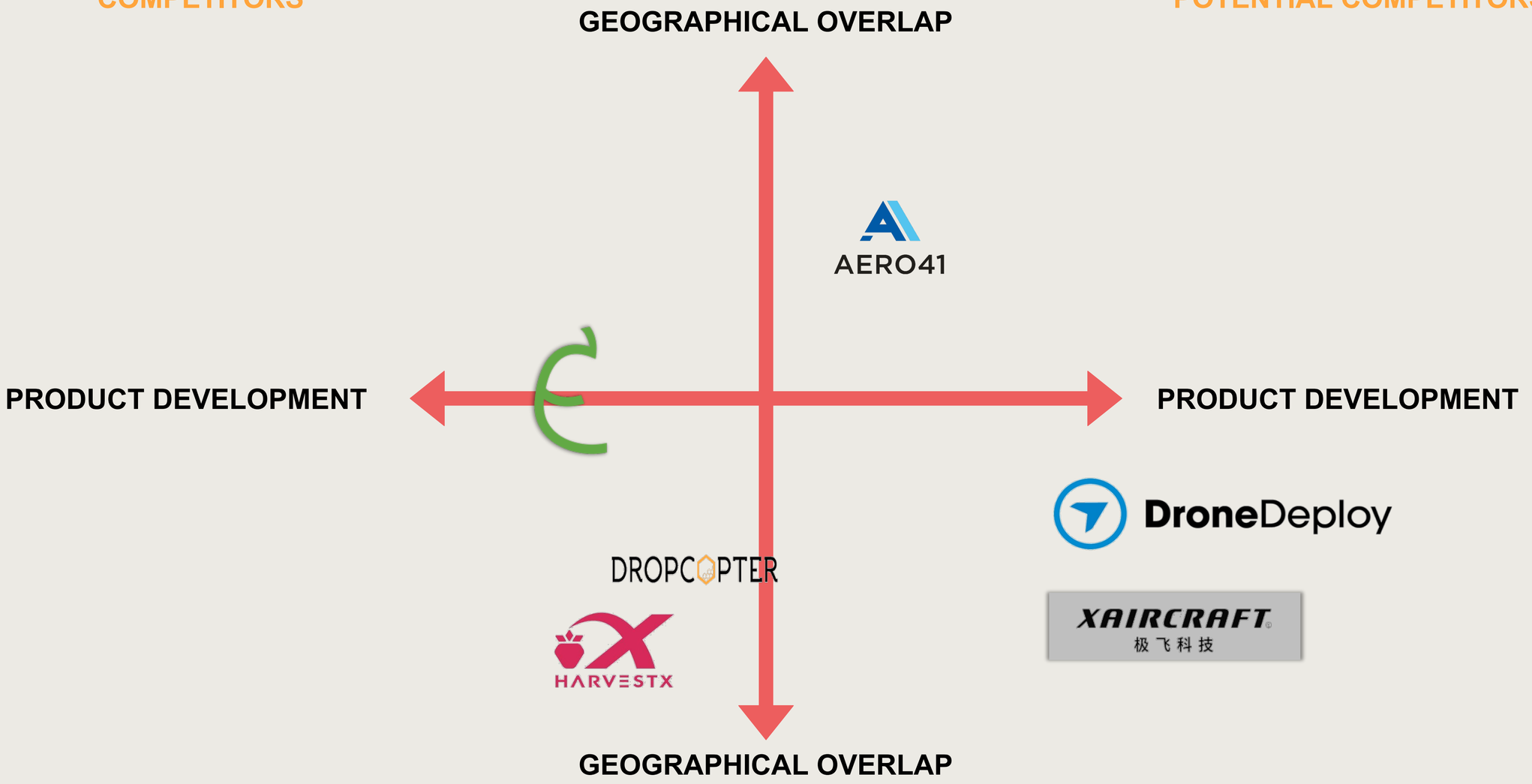
[1, 2, 3, 4](PitchBook Data, Inc. 2021)
*More details in the appendix

Competitor Analysis

THIS REVEALS A LARGE OPPORTUNITY

COMPETITORS

POTENTIAL COMPETITORS



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COMPETITORS OBJECTIVES

Direct Competitors

AGTECH POLLINATION START-UPS

edete
Precision Technologies for Agriculture

- Pollen-harvesting system for the collection of flowers
- Separation of pollen from anthers
- Long-term storage of pollen stock
- Autonomic system self-positioning at an optimal position to cover any open flower[1]

HARVESTX

- Company's technology recognizes flowers and fruits
- Using a depth camera and an image processing algorithm
- Thereby helps with pollination and harvesting[2]

DROPCOPTER

- The company's system provides aerial pollination and dry material crop dusting
- Helps in spreading any granular or powdered material with tactical accuracy
- Enabling farmers to pollinate orchards to increase crop yield[3]

Even though located in the US

[1](Edete Precision Technologies for Agriculture n.d.)
[2](HarvestX Inc. n.d.)
[3](Dropcopter n.d.)
*More details in the appendix

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COMPETITORS LIMITATIONS

Direct Competitors

AGTECH POLLINATION START-UPS

Drawbacks

edete
Precision Technologies for Agriculture

- Technological Set-Up
- Heavy machinery must move through the field
- Harming soil and vegetation
- Very time intensive

HARVESTX

- The company's technology is stationed and has a fixed set-up
- No agile and adaptable movement possible yet
- Research and development service

DROPCOPTER

- Spreading granular or powdered material by dispersing it over the tree
- Inaccuracy in hits
- Efficiency failure as pollen may not hit the stigma
- Costly as more pollen grains required

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OUR COMPETITIVE EDGE

1 Innovative Strategy

&

2 Technology Based Competitive Strategy

CUSTOMER ANALYSIS

(Chabybucko 2019)

Customer Analysis

THIS IS JOÃO

- Greenhouse farmer
- 33 years old
- Portuguese
- One child
- Wife Camila
- Medium-sized, family-owned greenhouse farm

(Prostock-Studio 2021)

Customer Analysis

LUCIA

- Apple farmer
- 40 years old
- Spanish
- No kids
- Husband Juan
- Farmer and member of Iberica Fruit Cooperation SL

(Mladenbalinovac 2021)

Customer Analysis

AND THIS IS ANTONIO

- Pear farmer
- 37 years old
- Italian
- Three children
- Wife Giulia
- Consortia member since 2015

What do all of them have in common?

THREE CORE VALUES

TRADITION

Farmers have mostly been working in family-owned businesses, based on very old routines, mostly inherited by former family members[1].

EFFICIENCY

Their efficiency is their only insurance to success. By providing perfect conditions and working very carefully, farmers only then receive a sufficient harvest[2].

COMMITMENT

Another important value of farmers is their commitment. Only by investing a large amount of time, regardless of weather conditions, their income is assured[3].

(Hertogh 2020)

[1, 2, 3](Beddard 2021)

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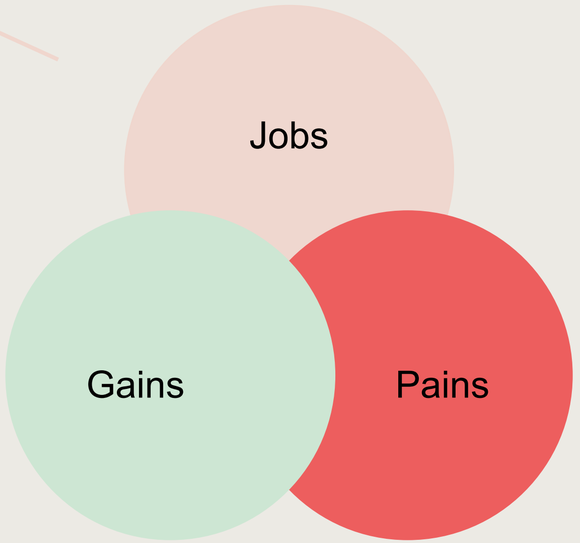
Customer Analysis

LET‘S STICK WITH ANTONIO…

HIS CUSTOMER PROFILE

1. HIS JOBS

- Pollinating orchards
- Buying pollen, beehives and machinery
- Employ workforce
- Harvest and sell fruits



2. HIS PAINS

- Hard physical work
- Weather conditions
- High labor costs
- High machinery costs
- High overall expenses
- Reliance on external factors
- Dissatisfying outcome of yield

3. HIS GAINS

- Amount of fruit being sold
- High fruit yield
- Aspirations; good weather conditions, functioning machinery
- Efficient pollination rate by bees or artificial process

PolliOne

Customer Analysis

... WHAT MAKES HIM SLEEPLESS AT NIGHT?

Extremely High Costs

Labor Scarcity

Time Consuming

Climate Conditions

Source Image: (Mladenbalinovac 2021)

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Customer Analysis

AND HOW CAN WE CHANGE THIS?

Technology Affine

- Mobile, Computer, Tablet

Anxious but eager for change

- Fruit yield decreasing
- Costs are increasing

Young & Dynamic

- 25-60, Male
- Approx. 11.000 - 27.000 € p.a. of income

Invests in Machinery

- Values innovations improving yield
- Open for help

*For full Customer Analysis please look in Appendix Slide “Customer Base Analysis”.
Source Image: (Mladenbalinovac 2021)

PolliOne

Customer Analysis

WE SPOKE TO THE MARKET

“

“Costs are increasing due to the insufficient use of pollen grains. Furthermore, the costs for pollen grains are steadily increasing based on rising demand.”

PollenPro

Jennifer Beddard[1]

“

“Farmers invest into the automation of production as much as they can. They are eager to automize everything.”

Sovena Group

João Basto[2]

“

“The main difficulties of our farmers, regarding pollination, is the lack of pollinating insects. […] the process can be very expensive […].”

FRUTALVOR

Ricardo Daniel Mendes[3]

[1](Beddard 2021)
[2](Basto 2021)
[3](R. D. Mendes 2021)

STATUS QUO

PolliOne

Status Quo

WHICH METHODS DOES ANTONIO USE?

FOR OPEN FIELD

= approx. **439 €/hectare**[1]

Traditional Pollination

+
- Use of traditional resources
- Environmentally friendly

−
- High costs
- Weather dependent
- Threat to wild bees[2]

= approx. **4 €/hectare**[3]

Plant Growth Regulators

+
- Increase in fruit sets
- Consistent fruit production

−
- Environmental hazard
- High labor costs
- Leaves traces on soil and ground
- Health concerns for consumers[4]

= approx. **4.000 €/hectare**[5]
+ (173.000 €/tractor)[5]

Machine Pollination

+
- Low labor costs
- Consistent fruit production

−
- Heavy machinery damages soil
- High initial investment
- Time extensive
- Lack of efficiency[6]

(Breeze, Dean and Potts 2017), (Wikipedia 2020)[1]
(Beddard 2021)[2]
(Overbeek 1952)[3]

Source Image 1: (Burden 2017), Source Image 2: (Henry & Co. 2018), Source Image 3: (Pugh 2017)

[4](Rademacher, 2015)
[5](Locknear n.d.), (Beddard 2021)
[6](Beddard 2021)

Status Quo

AND WHAT DOES JOÃO DO?

FOR GREENHOUSES

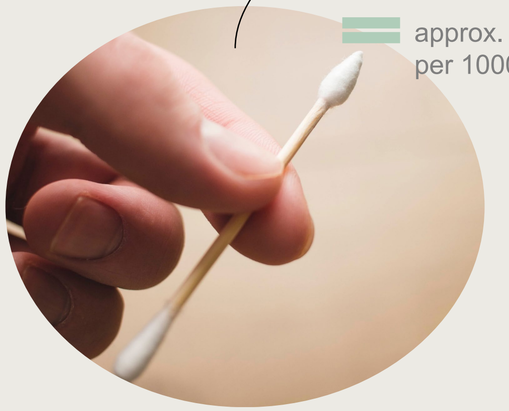
approx. **439 €/hectare**[1]

Traditional Pollination

approx. **4 €/hectare**[2]

Plant Growth Regulators

Difference to open field pollination



approx. **4 €** per 1000 flowers[3]

Hand Pollination

\+
- High pollination success rate[4]
- Consistent fruit production

–
- Extremely high labor costs[5]
- High material costs[6]
- Over-pollination[7]
- Labor accidents[8]
- Extremely time extensive[9]

(Breeze, Dean and Potts 2017), (Wikipedia 2020)[1]
(Overbeek 1952)[2]
(Zhang, et al. 2021)[3]
(Wurz, Grass and Tscharntke 2021)[4, 5, 6, 7, 8]
(Yang and Miyako 2020)[9]
Source Image 3: (Groblechner 2020)
*For further Information please view Appendix Slide “Cost of Hand Pollination in the US”.

PolliOne

“... we are always open to new tools that can enhance the quality and performance of our products.”

Carla Rasteiro

Technical Advisor at COOPVAL

PolliOne

WHY PEOPLE WANT TO WORK WITH US

(Griffiths 2019)

TIME EFFICIENCY

Nondependent on external factors

AGILITY

Drone moves in any kind of territory

MODERATE LABOUR

One pollination expert required

ADAPTABILITY

Service adaptable to the farmers personal needs

PRECISE POLLINATION

Pollination success is at over 90%[1]

ALL-IN-ONE

Pollination service on-site and customer support afterwards

[1](Yang and Miyako 2020)
Source Image: (Dress 2019)

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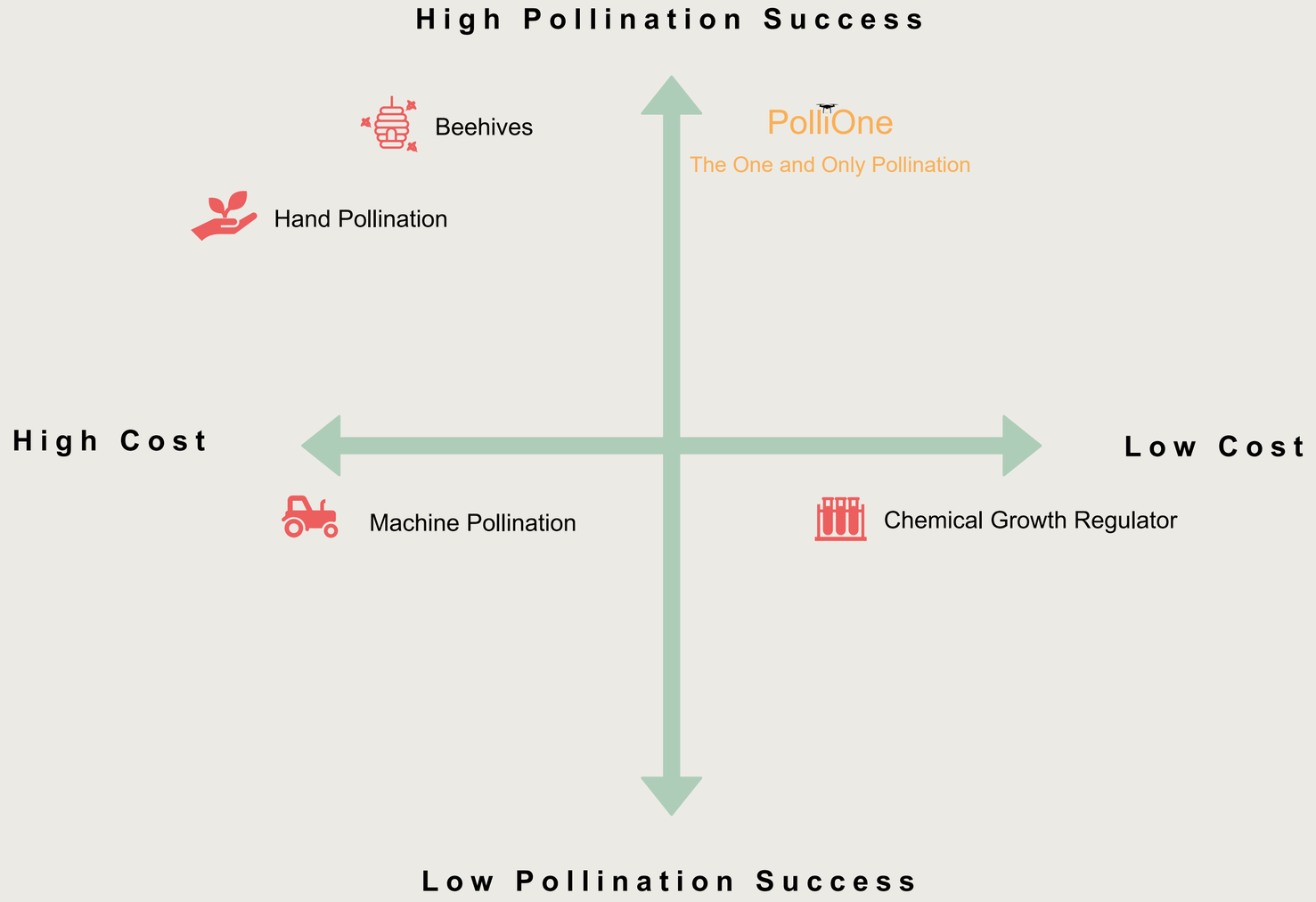
WHERE WE POSITION OURSELVES



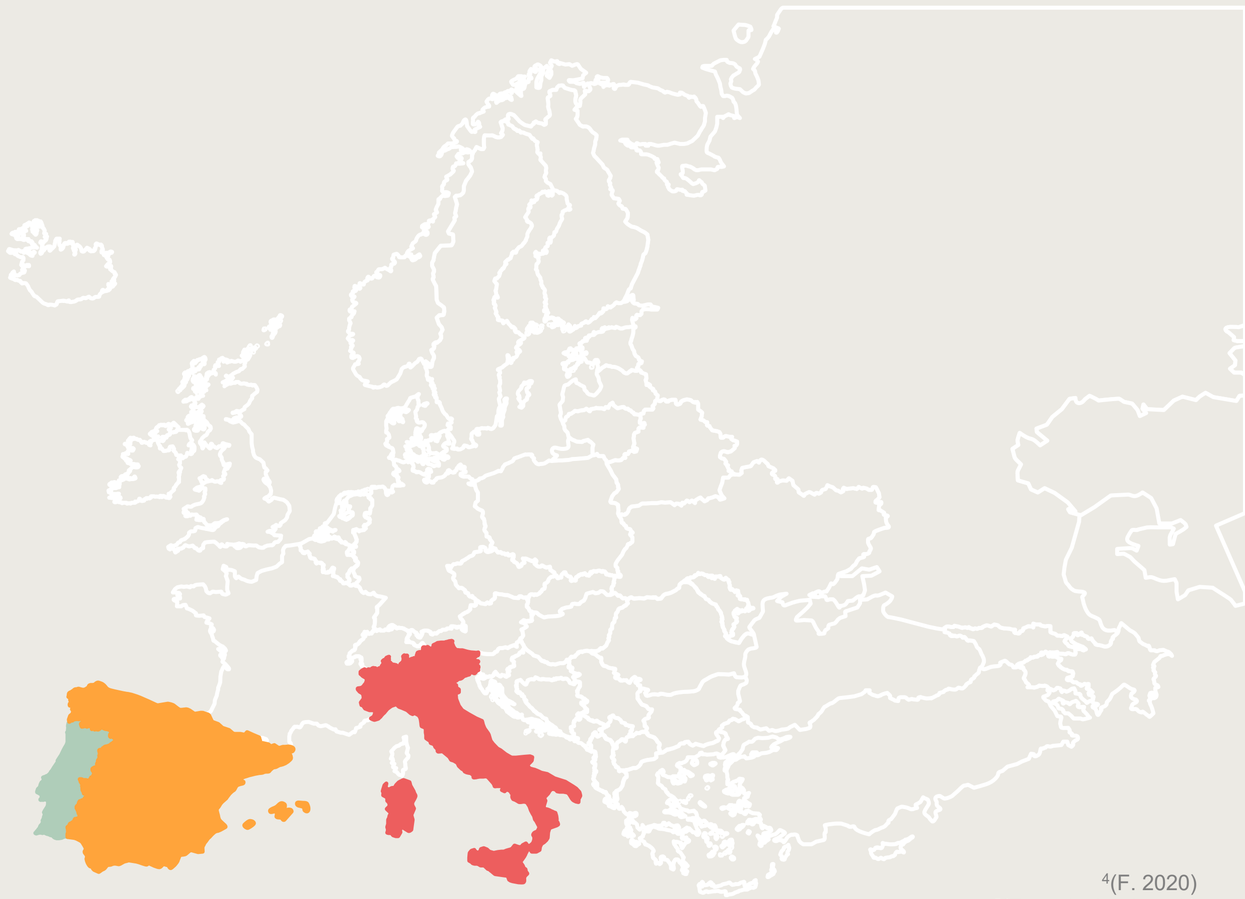
(Domanović 2020)

PolliOne

OUR TARGET CUSTOMERS

medium to large seized customers

	Revenue in Million
PORTUGAL	
• Frutalvor - Central Fruteira C.R.L.	8 EUR[1]
• Cooperativa Agrícola dos Fruticultores do Cadaval (Coopval)	n/a
SPAIN	
• Hawo Fruits Spain S.L.	30 EUR[2]
• Anecoop S. Coop.	770 EUR[3]
ITALY	
• Consorzio Melinda	100 EUR[4]
• Bergonzoni S.r.l.	8.4 EUR[5]



(Pedroso 2019)[1]
(INFORMA D&B S.A.U. (S.M.E.) n.d.)[2]
(FreshPlaza.it 2021)[3]

[4](F. 2020)
[5](Reportaziende n.d.)

VALUE PROPOSITION

PolliOne

OUR MISSION

To revolutionize the pollination process by providing accessible, customizable and efficient pollination for farmers.

OUR VISION

Is to be recognized as the number one smart pollination service for farmers worldwide.

OUR GOALS

PolliOne strives to become Europe’s leading smart farming start-up. It aims at starting operations by the end of 2025.

PolliOne

WHAT MAKES US DIFFERENT?

Our focus is artificial pollination

1. OUR PRODUCTS & SERVICES

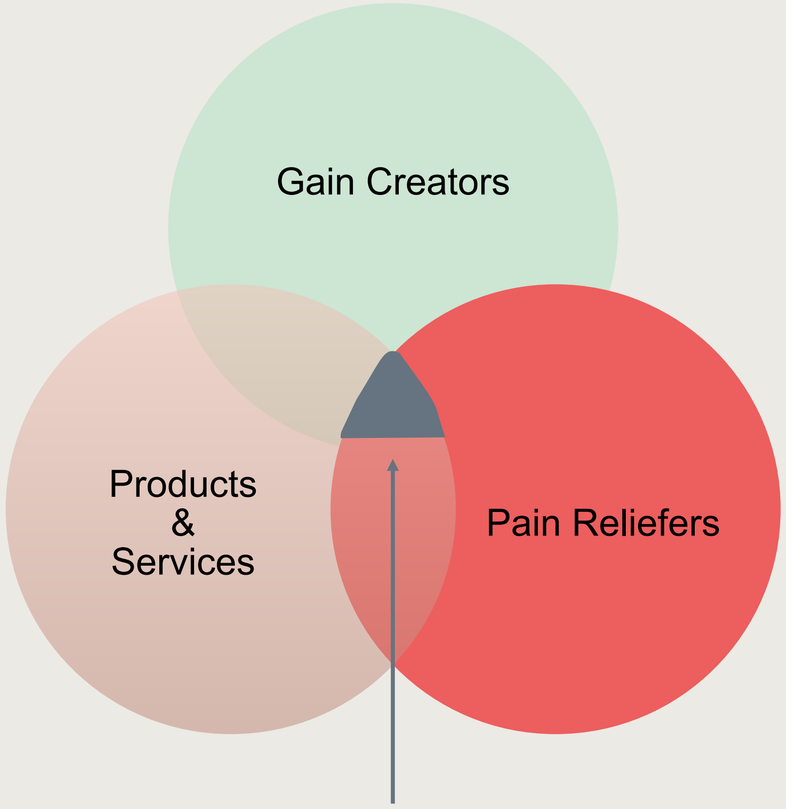
- Pollination Service
- Use of drones and innovative pollen disperser
- Time-efficient, inexpensive alternative

2. OUR PAIN RELIEFERS

- Eliminates labor and machinery costs
- Minimizes pollen grain costs
- Reduces time spent on field

3. OUR GAIN CREATORS

- Production of higher yield
- Increases profits
- Maximizes time for farmer



BUSINESS MODEL

(Salles 2019)

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OUR BUSINESS MODEL

SUBSCRIPTION-BASED MODEL OPEN FIELD FARMERS → Short Term

SUBSCRIPTION-BASED MODEL GREENHOUSE FARMERS → Medium Term

LICENSING AI-TECHNOLOGY → Long Term

PolliOne

HOW DOES THE SUBSCRIPTION WORK?

FOR OPEN FIELD FARMERS

1

Dependent on the pollination season of the fruit

- **Seasonal** pollination process, every year

2

Apple Season

*Early to late May[1]

Pear Season

*Late April to mid May[2]

- Between **1-2 months** a year

= price per season: 800€ p/hectare

(Orange Pippin Ltd n.d.)[1, 2]

PolliOne

IN THE FUTURE

FOR GREENHOUSES

1

All-year pollination service

- **Constant** pollination process throughout the year

2

Fruits & vegetables pollinated repeatedly

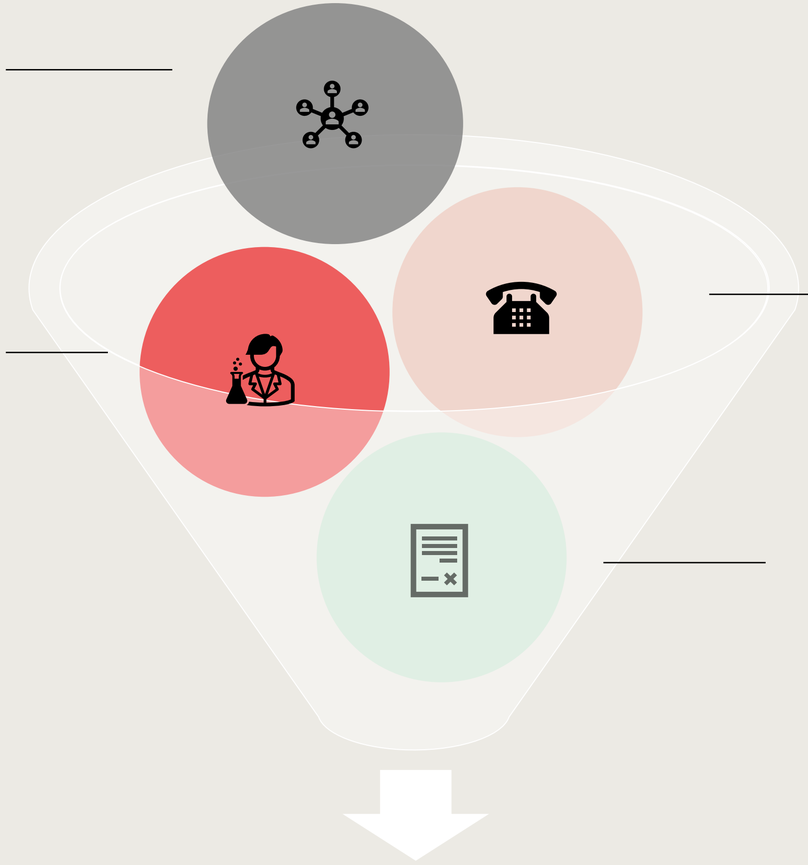
- Subscription model is **paid monthly**

PolliOne

OUR SALES PROCESS

What? Establish an intimate customer network.
How? Visit agricultural trade fairs to present our solution and tackle their challenges.

What? Convince customers of pollination reliability.
How? Through on-site testing.



What? Contact farmers via phone or on-site visits and start sales process.
How? Through our established network.

What? Close the deal by converting potential customers into real ones.
How? Convince them of our advantages by presenting scientific results*.

What? Ensure customers can utilize our PolliOne technology.

How? Through customer service hotline and our on-field experts.

*Please view Appendix Slide “The Science behind our solution“.

OPERATIONAL MODEL

(Paukshtite, 2018)

HOW DOES A FARMER GO FROM TRADITION TO INNOVATION?

PolliOne

Operational Model

OUR OPERATIONAL PROCESS

Partners	PolliOne	PolliOne	PolliOne
• Pollen grains • Drone • Flying software • 3D printing • Camera	• Assemble drone • Bubble liquid • Contracting farmer • Preparation	• Go on-site • Drone setup • Bubble inventory • Test run • Training	• Customer support • On-site support • Technical support

(Wolniak, 2021)

Operational Model

SUPPLIERS

The ability to change suppliers ensures adaptation and service delivery. The equipment updating over the years always allows us to be competitive.

(UFarmer S.r.l. 2021)

(Henrichs 2017)

PolliOne

Suppliers

DRONE AND FLIGHT SOFTWARE KEY FEATURES

- Autonomous and assisted flight mode[1]
- Payload up to 5,5 kg[2]
- Minimum of 30 minutes flight duration[3]
- Maximum speed of up to 65 kmh (no wind)[4]
- Resistant to atmospheric conditions and to the field[5]

[1, 2, 3, 4, 5](DJI 2021)

(DJI 2020)

PolliOne

Suppliers

CAMERA KEY FEATURES

SONY

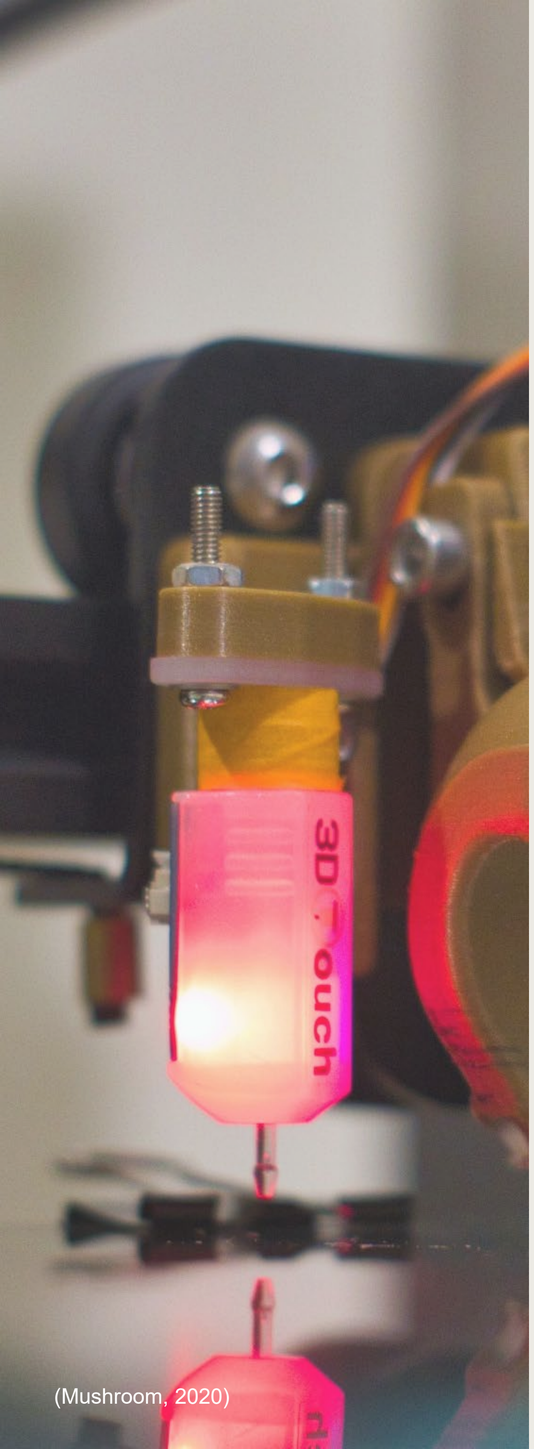
High image quality based on a 20-megapixel sensor[1]

Weight less than 300 gr in order to increase flight autonomy[2]

Normalized Difference Vegetation Index for vegetation vigour[3]

Doesn’t affect the cost of our service choosing a not advanced product

[1, 2](SONY 2021)
[3](Ahmad, et al. 2020)



(Mushroom, 2020)

PolliOne

Suppliers

3D PRINTING KEY FEATURES

- **Flexibility** in engineering our specified design[1]
- Small batches to enable a **prototype** and **final production**[2]
- **Carbon fiber** to reduce weight and increase strength[3]
- **30% lighter** overall weight and **10% higher stiffness**[4]

[1, 2, 3](Shahrubudin, Lee and Ramlan 2019)
[4](Abd Soud, Baqer and Ahmed 2019)

(Kitwood, 2018)

Suppliers

POLLEN GRAIN KEY FEATURES

Synergies with our partner to collect pollen from our customers

PollenPro's proprietary system for filtering pollen from flowers[1]

Pollination of king blooms, 3 times larger than a standard one[2]

Quantity, quality, specificity for each type of crop and fruit[3]

50% more efficient dispersion optimization than with ATVs[4]

[1, 2, 3, 4](PollenPro 2021)

Suppliers

HOW TO HARVEST POLLEN?

COLLECTION

- Mechanically acting on trees
- During blooming period[1]
- Filter machine separates pollen from the stamens[2]

STORAGE

- Pollen stored in refrigerators for one year
- Duration depends on type of fruit
- Apple and pear can be stored up to five years[3]

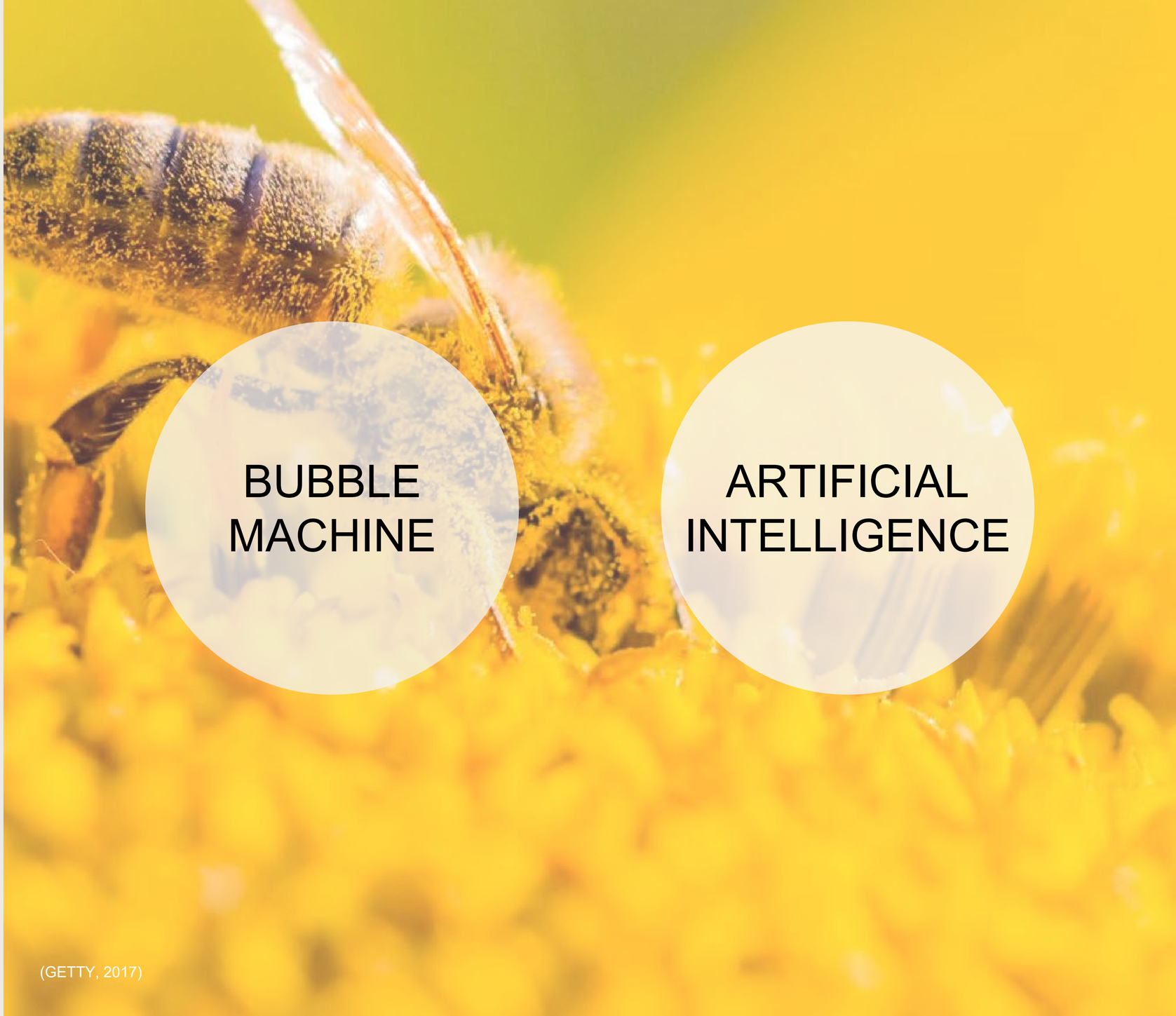
[1, 2, 3](PollenPro 2021)

RESEARCH & DEVELOPMENT

Development Processes

IN-HOUSE

Focusing on core developments enables us to differentiate from competitors and offer a unique solution.



(GETTY, 2017)

PolliOne

DISPERSE MACHINERY AND SOAP LIQUID

Closed tank
to preserve solution during flight

Quick and **accessible** refill

Brushless motor
runned by drone's batteries

Integrated tank in a **single chassis**

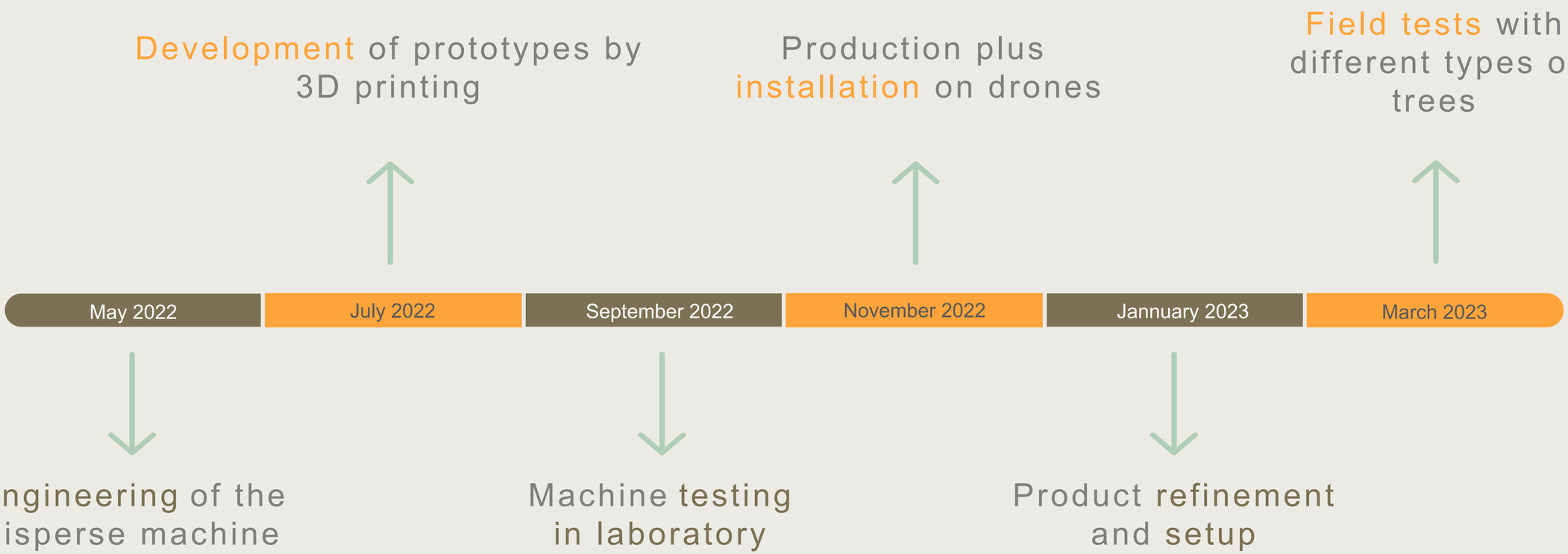
2% HPMC and 1% A-20AB
to stabilize the bubbles and make them sticky[1]

5000 soap bubbles
mechanically stabilized per minute[2]

[1, 2](Yang, Miyako 2020)
Source Image: (iStock n.d.)

Research and Development

DISPERSE MACHINE DEVELOPMENT



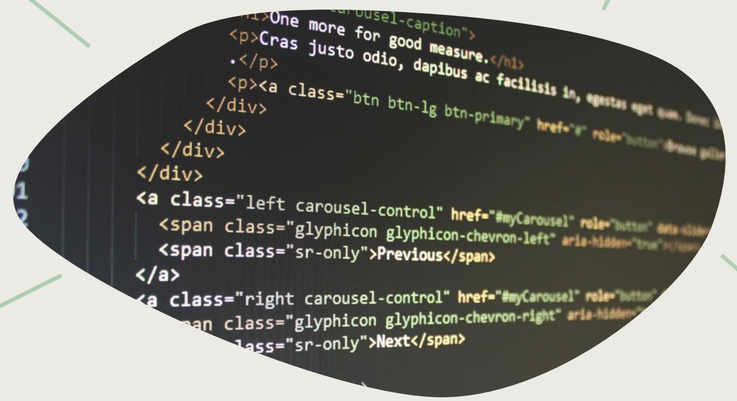
(Gonzaga Trabasso and Pessoa 2017)

Research and Development

ARTIFICIAL INTELLIGENCE

Analysis of tree characteristics to ensure optimal flight routes[1]

100% automated pollination, no labor required



Recognition of fruit blossoms to pollinate with great precision[2]

Autonomous drone flight[3]

Allows the drone to avoid obstacles and follow the rows of the orchard[4]

[1, 2](World Economic Forum 2021)
[3, 4](Becerra 2019)
Source Image: (Pixabay 2016)

PolliOne

ARTIFICIAL INTELLIGENCE DEVELOPMENT

Development of AI enabling detection of fruit blossom characteristics

May 2022

July 2022

Integration of AI with drone flight software

October 2022

Laboratory and field testing
trying different scenarios and fruit trees

June 2023

Intellectual property registration, including licensing purposes

(Results for Development 2019)

Research and Development

ARTIFICIAL INTELLIGENCE

HOW DOES IT WORK?

- Analyzation of orchard by:
  - **Number of trees**
  - **Arrangement**
  - **Presence of flowers**
  - **Obstacles**

- Dialogue between AI and drone flight software
- Providing commands and routes
- Estimation of refuelling[1]

WHAT DOES IT DO?

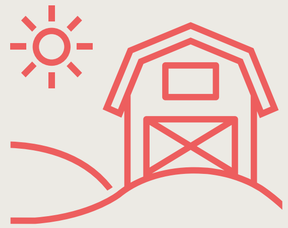
- Drone follows linear arrangement
- Longer pollination period
- Process is autonomous
- Pollen refill and battery replacement is autonomous[2]
- Average pollination cycle of one hectare is **2 hours**

Image Source: (Griffiths 2019) (Becerra 2019)[1, 2]

PolliOne ON SITE

Our customer journey explained

PolliOne



Our Expert

The Farmer

Drone Battery Station

Drone & Bubble Disperser

THE TEAM

WHO WILL MAKE THINGS POSSIBLE?

Alica Ulrich

CEO

B.A. Media & Communication Management

Professional Experience in Marketing & Project Management

Alessandro Ferioli

CGO

B.Sc. Business Administration

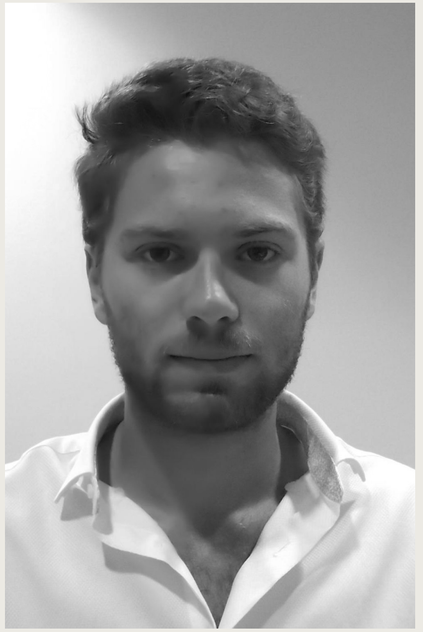
Professional Experience in Corporate Finance

Maxim Herbosch

CFO

B.Sc. Business & Economics

Professional Experience in Private Equity and Business Development



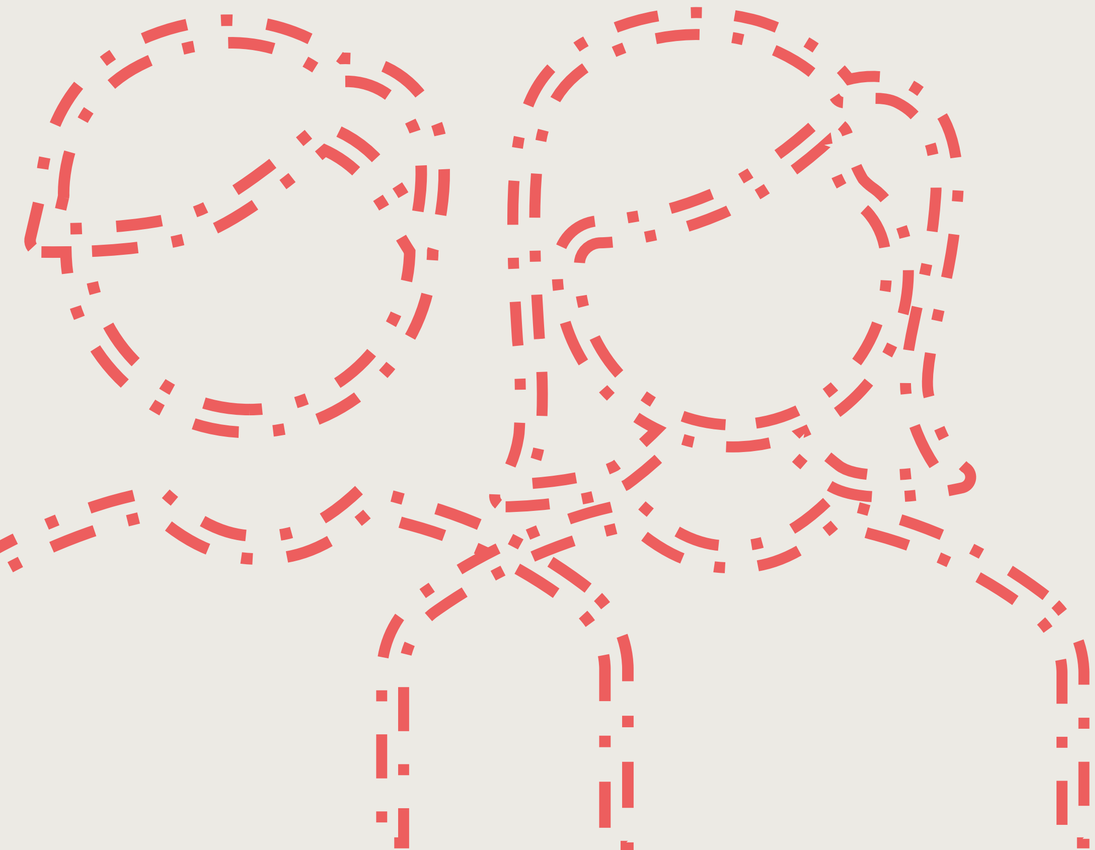
Andrea Epis

CPO

B.Sc. Business Administration

Professional Experience in Financial Markets

OUR TEAM IN THE FUTURE



- Chief Technology Officer - 2023
- Scientific Advisor - 2024
- Mechanical Engineer – 2024*
- Agronomist – 2024*
- Head of Sales - 2025
- Sales Employee - 2027

*Part Time

GO-TO-MARKET STRATEGY

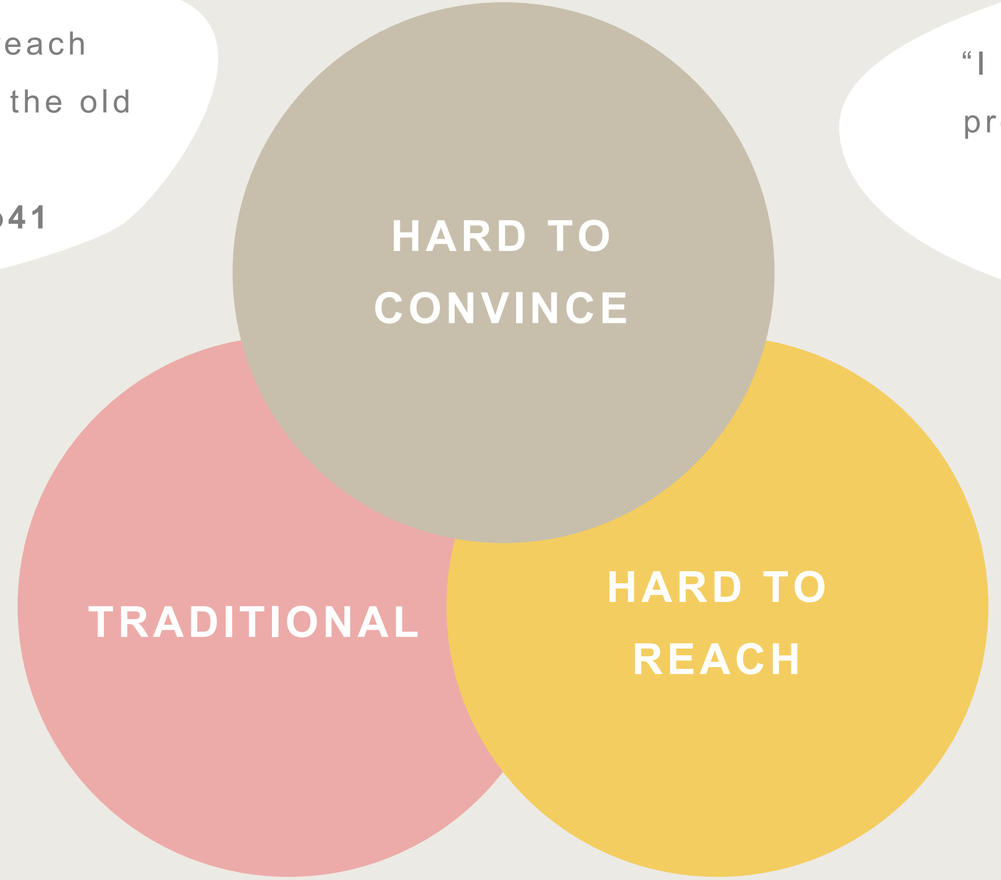
PolliOne

To Recap

FARMERS KEY BARRIERS

"In the beginning it's hard to reach farmers, you really need to fight the old mentality."
- Quentin Collet, CTO Aero41

"I would be interested, only if you can proof this solution is more efficient or saves me money."
- CEO, Visionagro



"We have always sticked to traditional pollination techniques."
- Ricardo Daniel Mendes, Frutalvor

"... they have significant cost, 560€ / hectare."
- Isabel Fonseca, Frutalmente

(Quentin 2021)[1]
(R. D. Mendes 2021)[2]

[3](Edo 2021)
[4] (Fonseca 2021)

PolliOne

Marketing

REACHING OUR CUSTOMERS

FOCUS

CONSORTIA

Melinda® D.O.P. MELA VAL DI NON

ROCHA DO OESTE PORTUGAL

CONSEJO REGULADOR DENOMINACIÓN DE ORIGEN MANZANA REINETA DEL BIERZO

EARLY ADOPTERS

TECH-SAVVY FARMERS

CHANNEL

DIRECT APPROACH
Face-to-Face/Telephone

FARMING JOURNALS & WEBSITES

The Olive Press

Revista agrotejo

FARM EXPOSITION

AGRITECHNICA® THE WORLD'S NO.

Expodrónica

altice FORUM braga

CTR CENTRAL AGRICULTURAL TRADE FAIR

WORD-OF-MOUTH

BENEFITS

- BREAK THE NORM
- FASTER ADOPTION
- RAPID EXPANSION
- NETWORK EFFECT

Growth Strategy

GO-TO-MARKET MILESTONES

2022
Set up our business and start **small-scale trials**

2023
Start to engage with the first customers by tackling agricultural **trade fairs**

2024
Start to increase number of customers and **strengthen our customer relationships** through developed sales process

2025
Conquer more space and follow new trends by offering different fruit varieties

2026
Aim at becoming profitable, scaling up and developing key partnerships

Potential future partner:
The World Apple & Pear Association[1]

[1](WAPA Association n.d.)

EXPANSION OPPORTUNITIES

- Similar characteristics to apples and pears in terms of pollination
  - Represent a **growth opportunity** for our company

ALMOND
- Not wind-pollinated
- Bloom for 3-week period yearly[1]

KIWI
- No nectar to attract insects
- Number of seeds depend on amount of pollen[2]

PUMPKIN
- Requires large amount of pollen
- Fruit quality enhanced by intensive pollinator activity[3]

SPAIN

2ND biggest pumpkin producer in the EU[4]
Biggest almond producer in the EU[5]

ITALY

2ND biggest kiwi producer worldwide[6]

(Goldowitz Jimenez 2020)[1]
(Science Learning Hub – Pokapū Akoranga Pūtaiao 2014)[2]
(Surcica, 2014)[3]

[4](Statista Inc. 2021)
[5](European Commission 2020)
[6](Medina 2021)

PRICING

PRICING DECOMPOSITION

Limited offering

Generic pollination services

KOPPERT BIOLOGICAL SYSTEMS

+/- €500/ha[1]

PREMIUM

The value we provide allows us to demand a premium price

PolliOne

Premium service

All-in-one

Efficiency

€800/ha

PRICE DRIVERS

Cost

Pollen grains

Expert service

Benefit

Yield increase

Expert support

[1](Silveira 2021)

FINANCIAL PLAN

GROWTH OBJECTIVES

Total apple and pear orchard area

Spain
41 400 ha*

Italy
85 000 ha*

Portugal
23 600 ha*

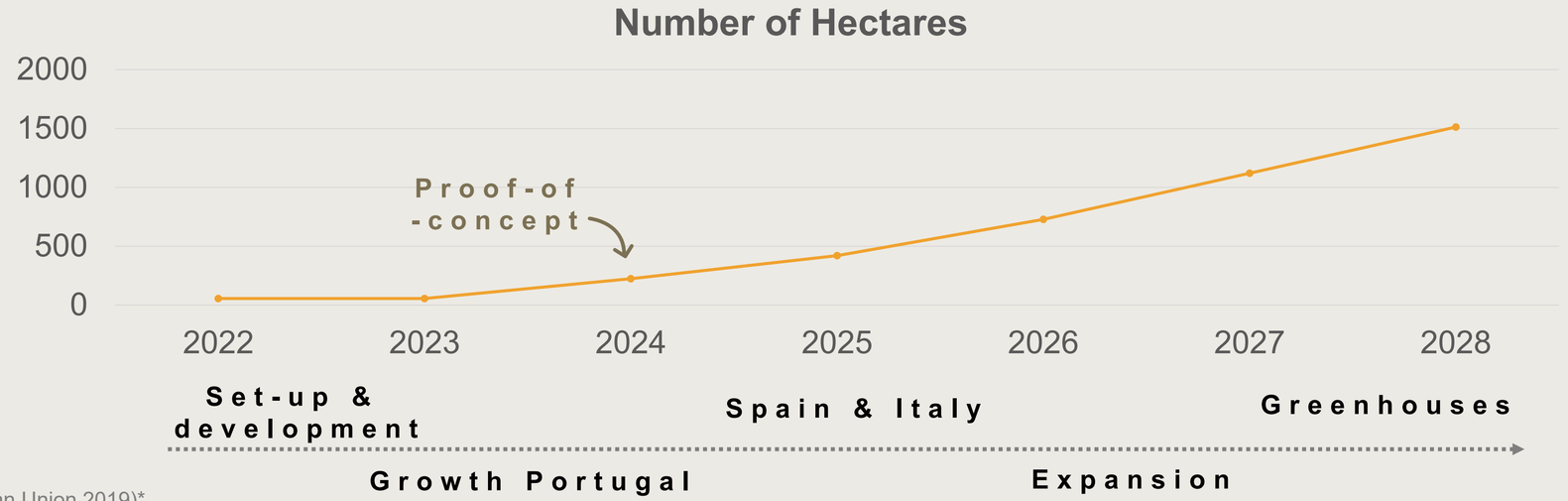
FOCUS

28+ hectares

Farmers with large lands

- ✓ Faster adoption and growth
- ✓ Higher profitability

Total 150 000 hectares *



ASSUMPTIONS

28 ha	Av. orchard size[1]
1 month	Pollination duration[2]
39 ha/drone	Pollination cycle
22	Optimal flying days[3]

(European Union 2019)*
(University of Illinois Board of Trustees 2021)[1]
(Silveira 2021)[2]

[3](Quentin 2021)

REVENUE FORECAST

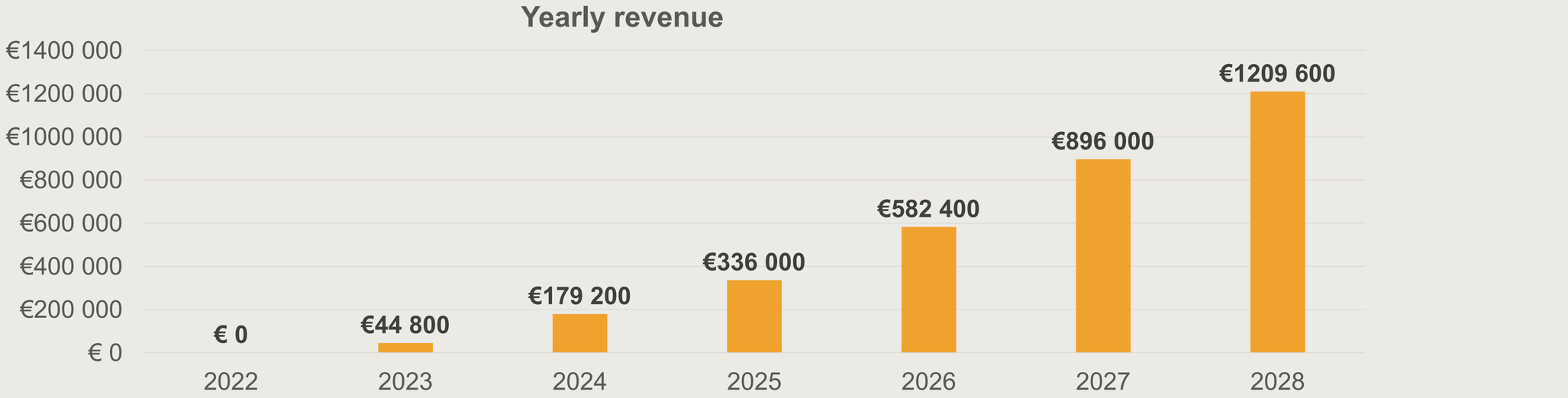
Revenues are driven directly by the number hectares we pollinate

DRIVERS

- Solid service
- Large customers
- Rapid pollination
- Greenhouses

RESULTS

- High customer retention
- Economies of scale
- Synergies between clients
- Additional revenue



Note: revenue and growth forecast were generated based on insights gathered from industry professionals such as: Quentin Collet, CTO Aero41

KEY EXPENSES

PolliOne

RESEARCH & DEVELOPMENT

For execution and analysis of field and lab testing cycles

- Mechanical engineer
- Artificial intelligence
- Renting laboratory
- Field test & analysis

CAPITAL EXPENDITURE

Purchase of assets, mainly costs from oursourcing

- Drone & flight software
- Camera
- Pollen
- Bubble machine 3D

OPERATING & SERVICE COSTS

Maintain appropriate expenses to run the day-to-day business smoothly

- Employees
- Storage room
- Office
- Logistics

(Butzi 2021)

RESEARCH & DEVELOPMENT

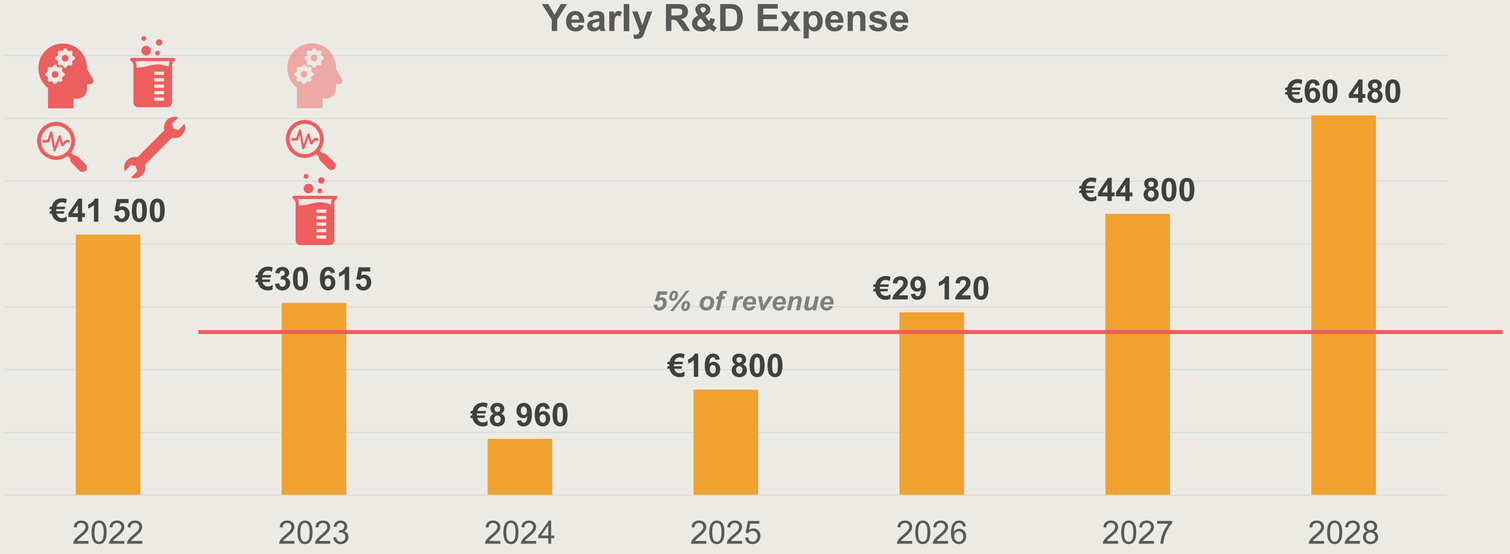
Bubble R&D Project

AI Technology Progress

Upfront R&D costs (until 2024) **€70k**

- ✓ Larger R&D investment during early years in order to build a strong proof-of-concept before 2025 target
- ✓ 5% of revenues reinvested into R&D to keep improving and providing our premium service

FREELANCE MECH. ENGINEER[1] (20h – 3 months *2)	€6 250
FEEDBACK ANALYSIS[2] (20h – 3 months *2)	€7 250
LABORATORY[3]	€18 000
EQUIPMENT & OTHER[4]	€10 000



(Economic Research Institute 2021)[1]
(Payscale, Inc. 2021)[2]
(Statista, Inc. 2021)[3]

[4](Quentin 2021)

CAPITAL EXPENDITURE

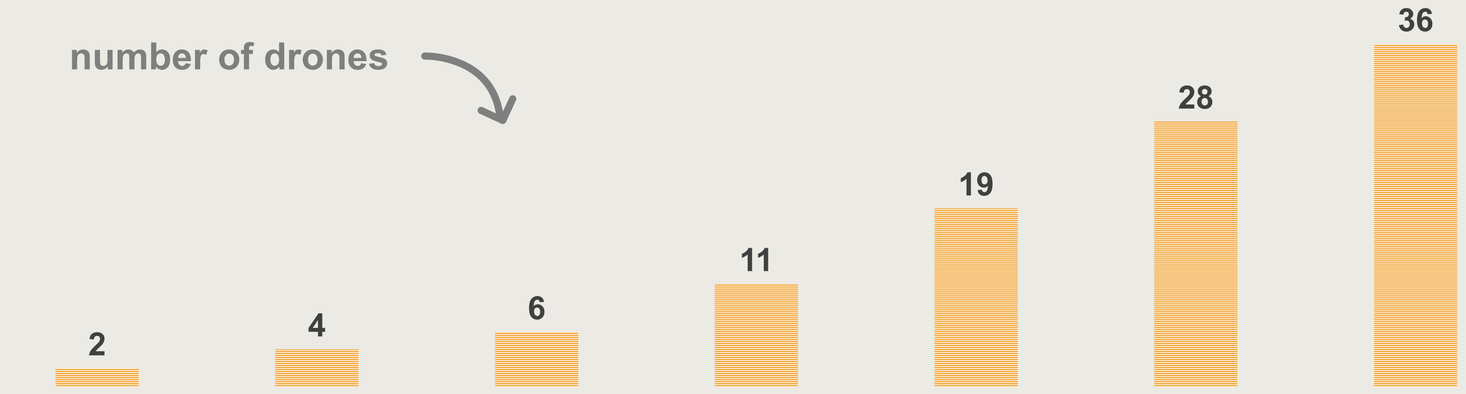
Since one drone can pollinate multiple farms per cycle, we will focus on **reaching as many hectares as possible with as few drones possible.** This implies that we will need to have an excellent service for our clients.

DRONES

DJI MATRICE 600[1] (incl flying software)	**€5 000**
CAMERA[2]	**€750**
BUBBLE MACHINE 3D PRINT[3]	**€150**
TOTAL COST	**€5 900** Per drone
REPAIR & OTHER[1/4] (e.g. battery, propellor)	**€700** Per client

POLLEN GRAINS[5]	**€100** Per hectare

2022	2023	2024	2025	2026	2027	2028
TESTING & DISCOVERY	DEVELOPMENT	PROOF OF CONCEPT	ITALY & SPAIN	EXPANSION	GREENHOUSES & GROWTH	



Pollen grains 55% of CapEx

Drone costs 40% of CapEx

Repair & other 5% of CapEx

(DJI 2021)[1]
(SONY ELECTRONICS INC. 2021)[2]
(EOS 2021)[3]

[4](Quentin 2021)
[5](PollenPro 2021)

OPERATING & SERVICE COSTS

- ✓ Given the seasonality in early stage, we will hire part-time to save cost
- ✓ Over time we can decrease our operating cost margin to around 45% in 2028

HR & OTHER

TEAM	€160 000
SCIENTIFIC ADVISOR	€20 000
CTO	€45 000
AGRONOMIST	€29 000/€3 625[F]
MECH. ENGINEER	€25 000/€3 125[F]
HEAD OF SALES	€35 000
SALES (employee)	€16 000
HQ & STORAGE[1]	€18 000/30 000
LOGISTICS (per advisor)	€1 000

2022	2023	2024	2025	2026	2027	2028
		1	2	4	6	8
		1	3	4	6	8
					2	2

	2022	2023	2024	2025	2026	2027	2028
TOTAL	€ /	€145 000	€250 750	€307 750	€378 750	€518 000	€560 000

[1](Statista, Inc. 2021)
[2](Europcar,2021)
Wages source: (Payscale, Inc. 2021)

WE EXPECT TO BE PROFITABLE BY 2026

2026

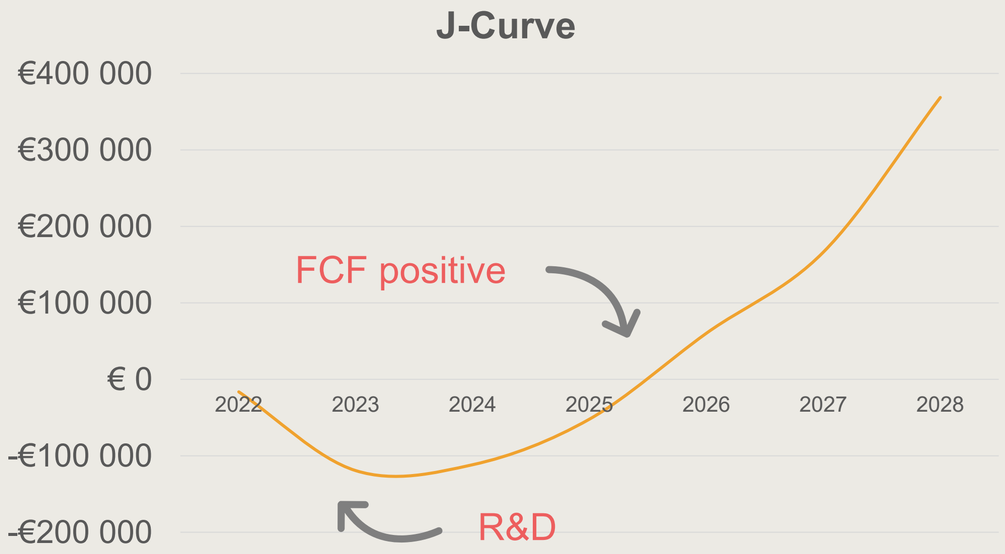
First year positive Free Cash Flow

€300 000

Cash burn until profitable

€6 825

Income per customer in 2028



WE WILL FIRST NEED FUNDING

GRANTS

€200k

€300 000

EQUITY INVESTMENT

€100k

VALUATION

AGTECH DEALS & VALUATION

DEAL COUNT

Evenly distributed across stages[1]

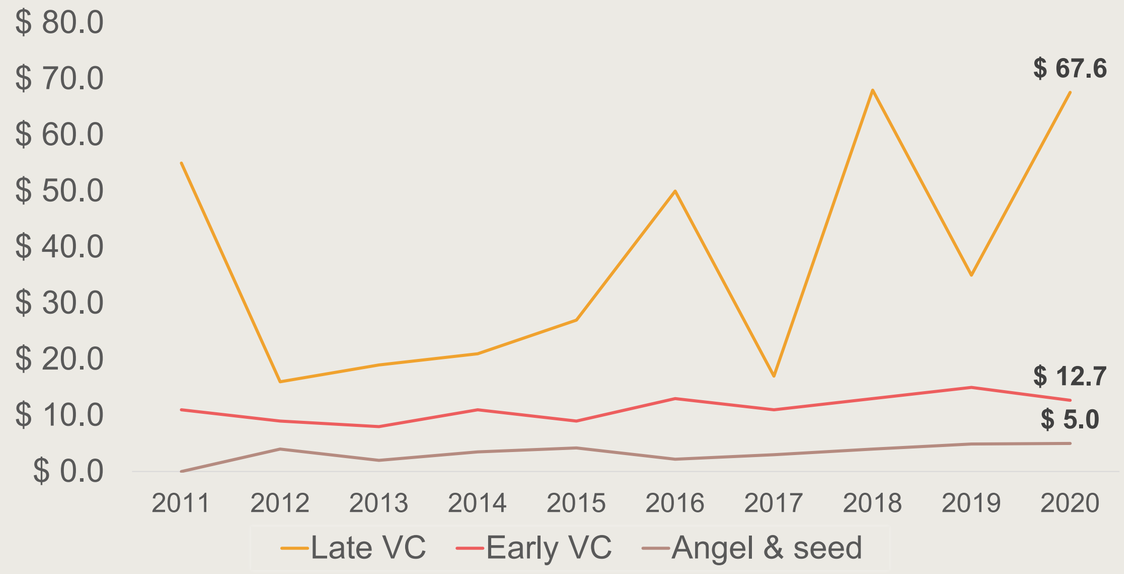
INVESTMENT VALUE

76% went to late-stage companies due to larger growth capital needs to move through long Agtech maturity cycle[1]

EXITS

2020 one of the busiest years on record as far as Agtech M&A and IPO activity[2]

Global median pre-money valuations ($M) by stage in Agtech



Source: Pitchbook

€4,43M*

AVERAGE ANGEL & SEED PRE-MONEY VALUATION

[1](Finistere Ventures LLC 2020)
[2](AgFunder 2021)
*USD/EUR = 0,89 (16/12/21)

PolliOne VALUATION

€100k
Investment

10%
Equity stake

€900k
Pre-money

HOW DO WE GET TO THIS VALUATION?

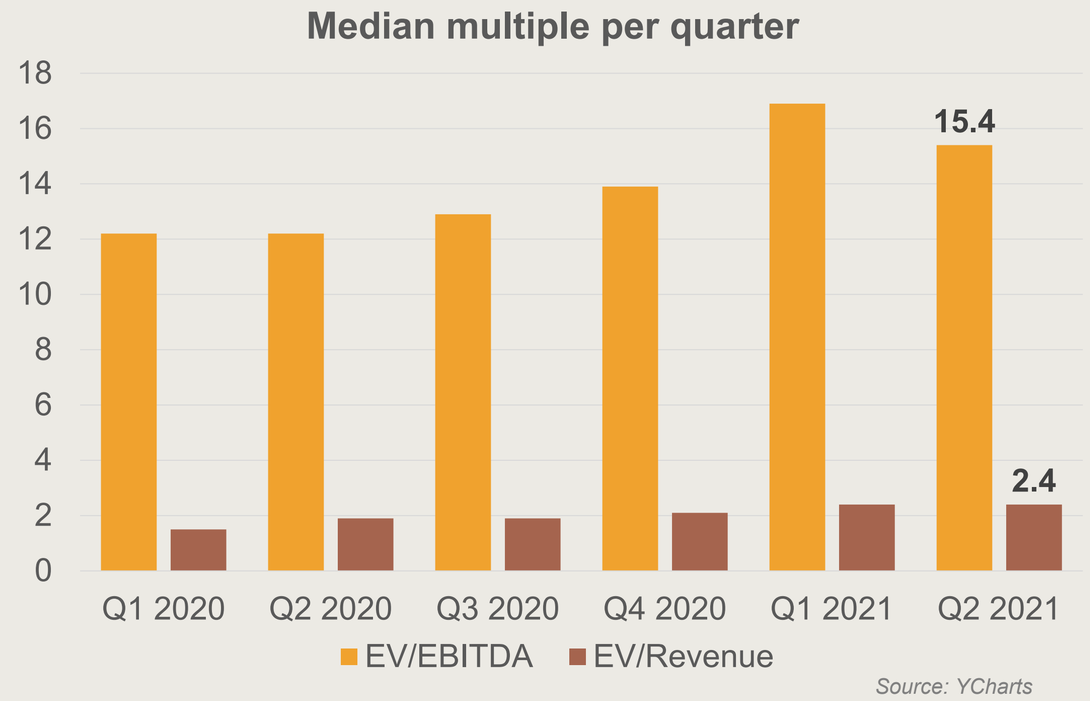
+

- Strong team to enable expansion
- Large market and growth potential
- Unique and premium offering
- Future relevance climate risk and food security

−

- Early-stage and no proof-of-concept
- Margin of failure only operation

A MULTI-MILLION EURO OPPORTUNITY



Source: YCharts

MARKET MULTIPLES

EV/REVENUE[1] 1,5x ⟶ 2,4x
EV/EBITDA[1] 12,2x⟶ 15,5x

PolliOne

- Valued as a Technology company
- Over time we will transition towards AI & Robotics
- ✓ **Robotics & AI** multiples around **5,9x** and **25,1x**[1]

EV/REVENUE 4,5x

EV/EBITDA 21,2x

PolliOne **POTENTIAL VALUATION** IN 7 YEARS (2028)

€7,4M

With an estimated revenue of around €1,2M and EBITDA around €440K in 2028

[1](Finerva 2021)

FINANCING

STRONG INCREASE IN AGTECH FUNDING

Agtech has truly caught the eye of investors, creating a strong fundraising environment

DRIVERS

A LOT OF CAPITAL AVAILABLE

LABOR SHORTAGES ON-FARM

NEED FOR STABILITY AND OPPORTUNITIES FOR IMPROVING AGRIFOOD TECH VALUE CHAIN

INVESTORS ARE RECOGNISING THE NEED FOR FOOD SECURITY

416
Completed financing rounds in 2020

50%
CAGR aggregate value of investment over the last decade

$5 Bn
Agtech investment in disclosed value in 2020

[1](AgFunder 2021)

FINANCIAL SUPPORT THROUGH GRANTS

RATIONALE

- Contribute to innovation
- UN SDGs – Food security
- Positive impact

ENABLER

GRANTS PROVIDER

Support Agtech project & startups

BENEFIT

- Early business validation
- Dilution avoided
- Credibility towards investors

PROVIDERS

European Commission

European Agricultural Fund for Rural Development (EAFRD)[1]

BUDGET

€95 billion

FOCUS

Grants and subsidies for agriculture projects (farmers, groups, organisations…)

Support Innovation Services support beyond stand-alone funding

€200K* TO OBTAIN FROM GRANTS

Grant providers might not provide the full amount, in this case we will rely more on equity investment

[1](EIP-AGRI Service Point 2014)

EQUITY INVESTORS

INVESTOR PROFILE

- ✓ Operational
- ✓ Agtech expertise & focus
- ✓ Strong network in Portugal, Spain and/or Italy

APPROACH

- ✓ Pro-actively approach investor
- ✓ Attend conferences
- ✓ Participate in incubators & accelerators

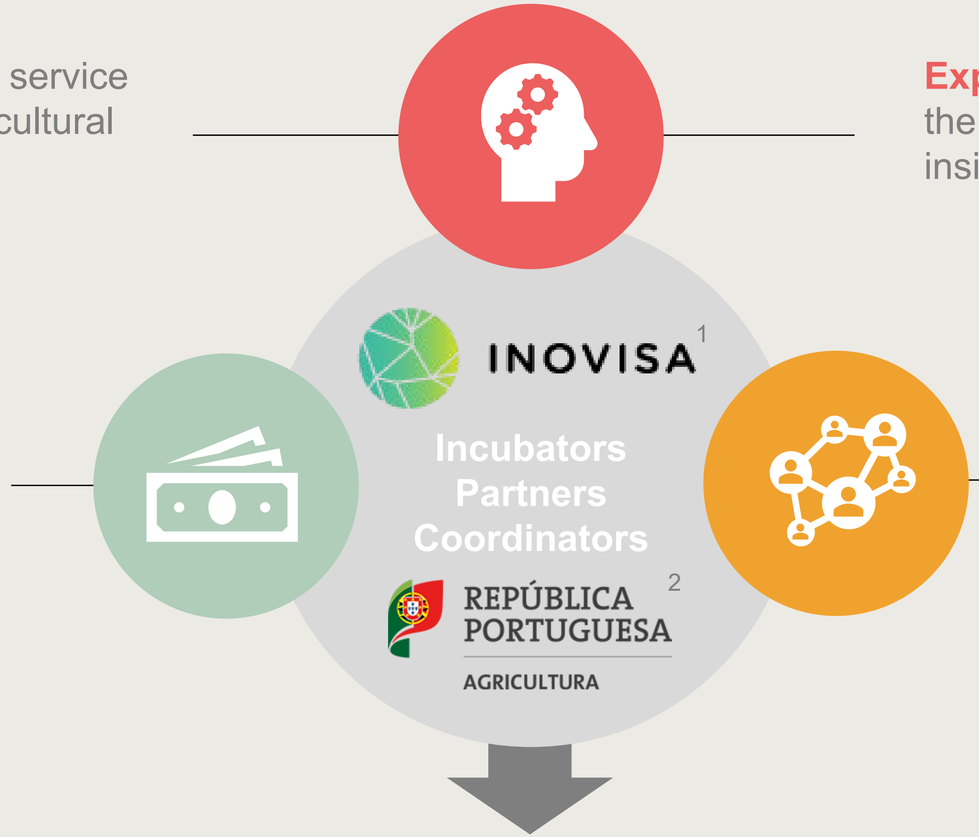
INVESTOR	Focus	Advantage	Conditions
2 ANGEL INVESTORS	Portuguese (with network in Spain) Strong network in Italy	Autonomy Less formal Easy and fast Credibility	*Mainly targeting angel investors given the early stage and little capital requirements*

€100K* TO OBTAIN FROM ANGEL INVESTORS

STRATEGIC GROWTH PARTNERS

Guidance on business, product and service development level targeting the agricultural sector

Expertise from seasoned professionals in the field providing valuable knowledge and insights to avoid mistakes in advance



Easier **access to funding** in the future, saving us valuable time, effort and costs

Access to a large local and international **network** which will strengthen links between our business and companies in the Agtech sector

Short run – build out strong business and obtain a foothold in **Portugal** to prepare for expansion

Long run – rapid expansion across Spain and Italy with efficient operations

[1](Inovisa 2019)
[2](Governo da República Portuguesa 2019)

REGULATIONS

PolliOne

EUROPEAN UNION AVIATION SAFETY

There are no regulations in place regarding fully autonomous drones

Three categories: open, specific and certified[1]

PolliOne = Open Category
- Intended for low-risk drone flights
- Flying a very light drone or are in the countryside[2]

The **Open Category** is split into:

A1: below 500 g

A2: below 2 kg

A3: below 25 kg[3]

Rules for A3 category

Using a drone for work:
1. […] Stay at least 50 meters horizontally away from people and 150 meters horizontally away from parks, industrial and built-up areas[6].
2. Read carefully the user manual[7]
3. Complete the training and pass the exam defined by your national competent authority or have a „Proof of completion for online training“ for A1/A3 ‚open‘ subcategory[8]

Flying in the countryside:
4. If your drone has a camera (unless it is a toy) or weighs 250g or more then you need to register with the CAA. You need to renew this registration every year[9]
5. Anyone flying a drone 250g or more needs to pass a test and get a flyer ID from the CAA10[10]

Additional Note

From **1 January 2023** new drones will have to meet a set of standards

[1, 2,](UK Civil Aviation Authority 2020)
[3](European Union Aviation Safety Agency n.d.)
[4, 5, 6](UK Civil Aviation Authority 2020)
[7, 8](European Union Aviation Safety Agency n.d.)
[9, 10] (UK Civil Aviation Authority 2020)

ROADMAP

PolliOne

OUR COMPANY THROUGH THE TIME

WHERE WE START

2021

Founding PolliOne

2022

- Investments in equipment & technology
- Testing & discovery

2023

- Hire CTO
- Development phase

2024

- Hire Scientific Advisor
- Proof of Concept

2025

- Hire Head of Sales
- Part-time Agronomist & Mech. Engineer
- Expand to Italy & Spain

2026

- Hire Scientific Advisor Nr.4
- First office opening
- Milestone: being profitable
- Expansion strategy

2027

- Hire Sales Employees
- Expand to Greenhouse customers
- Follow up on growth strategy

EXIT

2028

Full Operation

PolliOne

EXIT OPPORTUNITIES

DRIVE FOR ACQUISITION

Many investors looking to acquire smaller, innovative organizations[2]

BENEFIT

This way, large agribusiness players can augment their current platform initiatives

POTENTIAL ACQUIRERS[1]

KOPPERT BIOLOGICAL SYSTEMS

Zelnova Zeltia

Globachem Your Crop Counts

EXIT

2031

Company Buyout

We aim at securing

- Continuing service requirements
- Data security and privacy
- Costs
- Personnel
- Knowledge and documentation transfer

(PitchBook Data Inc. 2021)[1]
(AgFunder 2021)[2]

PolliOne

WHAT ABOUT THE BEES?

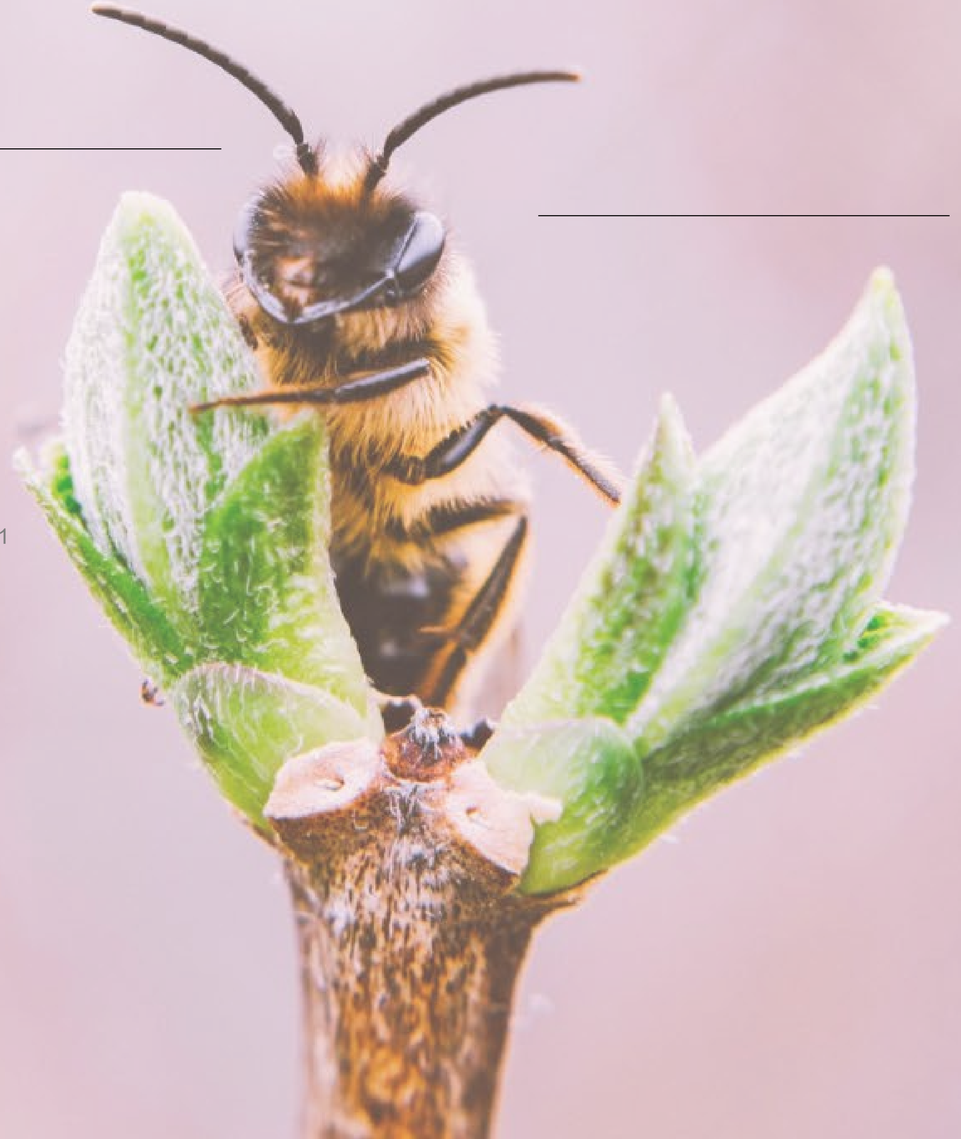
Will we **replace** bees and **threaten** their natural environment?

No!

1 **Drones don’t harm bees**
as bees stay close to the trees (below & medium height)[1]

2 We **boost biodiversity**
by farmers not having to use honeybees, leaving more room to native bees in the surrounding environments[2]

3 Honeybees from beehives **destabilize** natural ecosystems by competing with native bees[3]



From 2026 onwards, an amount will be donated to: non-profit organization:

BeeLife European Beekeeping Coordination

To show our commitment to creating a positive impact and saving the bee

[1](Mendes 2021)
[2, 3](McAfee 2020)

BIBLIOGRAPHY

Bibliography

THE CHALLENGE & WHO WE ARE

Captain Planet Foundation. 2020. Pollinator Quest. Accessed 11 30, 2021. https://herofortheplanet.org/pollinators/explore/life-cycle/.

Dids. 2021. Pexels. 10 15. Accessed 11 18, 2021. https://www.pexels.com/de-de/foto/fliegen-tier-biene-flugel-9907289/.

Dress, Andreas. 2019. Unsplash. 05 08. Accessed 10 15, 2021. https://unsplash.com/photos/C8UjCsWp3Go.

European Parliament. 2021. News - European Parliament. 06 09. Accessed 11 2021, 2. https://www.europarl.europa.eu/news/en/headlines/society/20191129STO67758/what-s-behind-the-decline-in-bees-and-other-pollinators-infographic.

Gold, Dan. 2016. Unsplash. 08 14. Accessed 10 14, 2021. https://unsplash.com/photos/hXaHghBkEMQ.

Greenpeace. n.d. Greenpeace. Accessed 11 2021, 14. https://www.greenpeace.org/usa/sustainable-agriculture/save-the-bees/.

Microsoft Corporation. 2021. Biene. 11 09.

Pacharkar, Shantanu. 2021. Unsplash. 02 18. Accessed 10 13, 2021. https://unsplash.com/photos/y6JzsQkKDPo.

Rie, Pok. 2017. Pexels. 12 10. Accessed 11 07, 2021. https://www.pexels.com/de-de/foto/graue-quadcopter-drohne-724921/.

Yang, Xi, and Eijiro Miyako. 2020. Soap Bubble Pollination. iScience.

MARKET & COMPETITOR ANALYSIS

Bayer AG. 2019. Forbes. 10 14. Accessed 10 16, 2021. https://www.forbes.com/sites/bayer/2019/10/14/the-value-of-pollinators-to-the-ecosystem-and-our-economy/?sh=76f0b36a7a1d.

Britannica, The Editors of Encyclopaedia. 2021. Britannica. 09 24. Accessed 12 01, 2021. https://www.britannica.com/plant/pear.

CBI Ministry of Foreign Affairs. 2021. CBI . 09 28. Accessed 10 15, 2021. https://www.cbi.eu/market-information/fresh-fruit-vegetables/apples/market-potential.

Dropcopter. n.d. Dropcopter. Accessed 12 07, 2021. https://www.dropcopter.com.

Edete Precision Technologies for Agriculture. n.d. Edete. Accessed 12 07, 2021. https://www.edetepta.com.

European Commission. 2021. The Apple Market in the EU - Production, areas and yields. European Commission.

European Commission. 2021. The Pear Market in the EU - Production, yields and areas. European Commission.

Guset User. 2015. "FLIPHTML5." 08 18. Accessed 10 15, 2021. https://fliphtml5.com/dnki/efwq/basic.

HarvestX Inc. n.d. HarvestX. Accessed 12 07, 2021. https://harvestx.jp/en/.

Keogh, Robert C., Anthony PW. Robinson, and Ian J Mullins. 2010. Pollination Aware - The Real Value of Pollination in Australia. Australia: Rural Industries Research and Development Corporation.

Knowledge Sourcing Intelligence LLP. 2021. Knowledge Sourcing. 07. Accessed 10 16, 2021. https://www.knowledge-sourcing.com/report/global-pollination-market.

Meyers, Dan. 2019. Unsplash. 07 19. Accessed 10 16, 2021. https://unsplash.com/photos/0AgtPoAARtE.

Miserius, Madlen, and Hans-Christoph Dr. Behr. 2021. Fruit Logistica - European Statistics Handbook. Berlin: Messer Berlin GmbH.

Organisation for economic co-operation and development. 2018. OECD Fruit and Vegetables Scheme. Seville: OECD.

PitchBook Data, Inc. 2021. PitchBook. 12. Accessed 12 05, 2021. https://pitchbook.com.

Rawpixel. n.d. rawpixel. Accessed 12 01, 2021. https://www.rawpixel.com/services/licenses.

Sharifani, M. Mehdi. 1997. Pollination, Fruit Set and Identification Studies in Pear. South Australia: The University of Adelaide .

Sheffield, Cory S., Hien T. Ngo, and Nadine Azzu. 2016. A Manual on Apple Pollination. Rome: Food and Agriculture Organization of the United Nations.

Silveira, Nuno, interview by Maxim Herbosch. 2021. Pollination Interview (10 21).

Statista Inc. 2021. Statista. 02. Accessed 12 05, 2021. https://www.statista.com/statistics/812434/production-volume-of-leading-kiwi-producing-countries/.

Statista, Inc. 2021. Statista. Accessed 11 20, 2021. https://www.statista.com/statistics/1198581/exports-value-fruits-from-spain-by-destination/.

—. 2020. Statista. 07. Accessed 11 20, 2021. https://www.statista.com/statistics/1023106/value-of-fruit-and-vegetables-products-exported-from-italy/.

Valverde, Carmen. 2021. "Portuguese Fruit Sector Aims to Increase Investments Efficiency and Exports." Madrid.

CUSTOMER ANALYSIS, STATUS QUO & BUSINESS MODEL – PART 1

Allsopp, Mike H. , Willem J. de Lange, and Ruan Veldtman. 2008. Valuing Insect Pollination Services with Cost of Replacement. Capetown: Plos One.

Basto, João, interview by Alica Ulrich. 2021. Pollination Interview (11 02).

Beddard, Jennifer, interview by Alica Ulrich. 2021. Pollination Interview (10 25).

Breeze, Tom D , Robin Dean, and Simon G Potts. 2017. The costs of beekeeping for pollination services in the UK – an explorative study. Journal of Apicultural Research.

Burden, Aaron. 2017. Unsplash. 09 02. Accessed 10 14, 2021. https://unsplash.com/photos/6csuZQ9oZcI.

Chabybucko. 2019. iStock. 05 03. Accessed 12 10, 2021. https://www.istockphoto.com/photo/hi-is-proud-farmer-gm1146658176-309047751.

Charania, Imran, and Xinrong Li. 2019. Smart farming: Agriculture's shift from a labor intensive to technology native industry. Elsevier.

Domanović, Vjekoslav . 2020. 03 03. Accessed 10 14, 2021. https://unsplash.com/photos/ve_jIq0zn8Q.

Dress, Andreas. 2019. Unsplash. 05 08. Accessed 10 15, 2021. https://unsplash.com/photos/C8UjCsWp3Go.

European Commission. 2019. Analytical factsheet for Italy: Nine objectives for a future Common Agricultural Policy. European Commission.

European Commission. 2019. Analytical factsheet for Portugal: Nine objectives for a future Common Agricultural Policy. European Commission.

European Commission. 2021. Progress in the implementation of the EU Pollinators Initiative. Brussels: European Commission.

European Commission. 2021. The Apple Market in the EU - Production, areas and yields. European Commission.

European Commission. 2021. The Pear Market in the EU - Production, yields and areas. European Commission.

F., Vincenzo. 2020. BorsaMagazine.it. 05 08. Accessed 12 13, 2021. https://www.borsamagazine.it/economia/consorzio-melinda-ottimi-ricavi-ma-pesano-investimenti/.

FreshPlaza.it . 2021. Fresh Plaza. 04 27. Accessed 12 13, 2021. https://www.freshplaza.it/article/9314853/un-fatturato-record-di-770-5-milioni-di-euro-per-anecoop/.

Griffiths, Alora. 2019. Unsplash. 09 19. Accessed 10 24, 2021. https://unsplash.com/photos/BoKt2YhFm3E.

Groblechner, Sara. 2020. Unsplash. 05 13. Accessed 10 08, 2021. https://unsplash.com/photos/Vd1j0I7ycq0.

Henry & Co. 2018. Unsplash. 02 16. Accessed 10 8, 2021. https://unsplash.com/photos/H_zgiRu6Bko.

Hertogh, Tomas. 2020. Unsplash. 11 22. Accessed 11 03, 2021. https://unsplash.com/photos/eS6rqvLx7o0.

INFORMA D&B S.A.U. (S.M.E.). n.d. elEconomista.es. Accessed 12 13, 2021. https://ranking-empresas.eleconomista.es/HAWO-FRUITS-SPAIN.html.

Keogh, Robert C., Anthony PW. Robinson, and Ian J Mullins. 2010. Pollination Aware - The Real Value of Pollination in Australia. Australia: Rural Industries Research and Development Corporation.

CUSTOMER ANALYSIS, STATUS QUO & BUSINESS MODEL – PART 2

Knop, Zoller, Ryser, Gerpe, Hörler, and Fontaine. 2017. EU Pollinator Initiative. Nature.

Locknear, Francis. n.d. THECOSTGUYS. Accessed 12 12, 2021. https://thecostguys.com/business/tractor.

Madushanki, A. A. Raneesha, Malka N Halgamuge, W. A. H. Surangi Wirasagoda, and Ali Syed. 2019. Adoption of the Internet of Things (IoT) in Agriculture and Smart Farming towards Urban Greening: A Review. Melbourne: International Journal of Advanced Computer Science and Applications.

Mendes, Ricardo Daniel, interview by Alica Ulrich. 2021. Pollination Interview (12 07).

Miserius, Madlen, and Hans-Christoph Dr. Behr. 2021. Fruit Logistica - European Statistics Handbook. Berlin: Messer Berlin GmbH.

Mladenbalinovac. 2021. iStock. 09 20. Accessed 12 10, 2021. https://www.istockphoto.com/photo/young-farmer-on-his-farm-gm1339341173-419713659.

National Academy of Sciences. 2018. Science Breakthroughs to Advance Food and Agricultural Research by 2030. Washington: The National Academic Press.

Orange Pippin Ltd. n.d. Orange Pippin Fruit Trees. Accessed 10 16, 2021. https://www.orangepippintrees.com/articles/planting-growing/pollination-of-fruit-trees.

Overbeek,]. Van. 1952. Agricultural Application of Growth Regulators and their physiological Basis. Claifornia: Shell Oil Company.

Parminter, T.G., and A. M. L. Perkins. 1997. Applying an understanding of farmers values and goals to their farming styles. Hamilton: New Zealand Grassland Association.

Pedroso, Eduardo. 2019. Top 100 Cooperatives 2019 - Women in the Portuguese Cooperative Sector. Cooperativa António Sérgio para a Economia Social.

Potts, S., K. Biesmeijer, R. Bommarco, T. Breeze, L. Carvalheiro, M. Franzén, J.P. González-Varo, et al. 2015. Status and trends of European pollinators. Sofia: Pensoft Publishers.

Prostock-Studio. 2021. iStock. 07 02. Accessed 12 10, 2021. https://www.istockphoto.com/photo/business-outside-new-normal-startup-and-juice-production-from-eco-fruit-harvesting-gm1326421113-411133732.

Pugh, Spencer. 2017. Unsplash. 02 18. Accessed 10 08, 2021. https://unsplash.com/photos/uzDCTCx6GXE.

Rademacher, Wilhelm. 2015. Plant Growth Regulators: Backgrounds and Uses in Plant Production. New York: Springer Science + Business Media .

Radulescu, Violeta, and Iuliana Cetina. 2012. Customer analysis, defining component of marketing audit. Elsevier.

Ray, Deepak K., Nathaniel D. Mueller, Paul C. West, and Jonathan A. Foley. 2013. Yield Trends Are Insufficient to Double Global Crop Production by 2050. Minesota: Plos One.

Reportaziende. n.d. Reportaziende. Accessed 12 13, 2021. https://www.reportaziende.it/bergonzoni_srl.

Saez , A., A. Di Virgilio, F. Tiribelli, and B. Geslin. 2018. Simulation models to predict pollination success in apple orchards: a useful tool to test management practices. DIB and Springer .

Salles, Gautier. 2019. Unsplash. 04 11. Accessed 11 02, 2021. https://unsplash.com/photos/WeugftFS2Ns.

Samnegård, Ulrika, Peter A. Hambäck, and Henrik G. Smith. 2019. Pollination treatment affects fruit set and modifies marketable and storable fruit quality of commercial apples. Royal Society Open Science.

CUSTOMER ANALYSIS, STATUS QUO & BUSINESS MODEL – PART 3

Sheffield, Cory S., Hien T. Ngo, and Nadine Azzu. 2016. A Manual on Apple Pollination. Rome: Food and Agriculture Organization of the United Nations.

Wikipedia. 2020. Wikipedia - The Free Encyclopedia. 10 13. Accessed 12 14, 2021. https://en.wikipedia.org/wiki/Pollination_management.

Wurz, Annemarie, Ingo Grass, and Teja Tscharntke. 2021. Elsevier.

Yang, Xi, and Eijiro Miyako. 2020. Soap Bubble Pollination. iScience.

Zhang, Huimin, Yancheng Liu, Zhiping Zhang, and Minmin Miao. 2021. Labour Costs on the Vegetables: A Research on the location effect on salaries in Jiangsu Province, China. Santa Maria : Ciênica Rural.

OPERATIONAL MODEL & RESEARCH AND DEVELOPMENT

Abd Soud, Wafa, Ihsan A. Baqer, and Mohammed Rasool Ahmed. 2019. Effects on the Mechanical Properties of the Carbon-Fiber and Polylactic Acid Specimens. Iraq: Engineering and Technology Journal.

Ahmad, Ali, Javier Ordoñez, Pedro Cartujo, and Vanesa Martos. 2020. Remotely Piloted Aircraft (RPA) in Agriculture: A Pursuit of Sustainability. Granada: agronomy.

azur13. 2018. iStock. 03 18. Accessed 10 14, 2021. https://www.istockphoto.com/it/foto/ape-di-miele-ricoperta-di-polline-giallo-che-raccoglie-nettare-in-fiore-gm933805010-255760876.

Becerra, Victor M. Becerra. 2019. Autonomous Control of Unmanned Aerial Vehicles. Portsmouth: electronics.

DJI. 2021. dji. Accessed 11 13, 2021. https://www.dji.com/pt.

—. 2021. dji. Accessed 10 21, 2021. https://www.dji.com/pt/matrice600.

Gonzaga Trabasso, Luís, and Marcus V. P. Pessoa. 2017. The Product Development System. ResearchGate.

Griffiths, Alora. 2019. Unsplash. 09 19. Accessed 10 24, 2021. https://unsplash.com/photos/BoKt2YhFm3E.

Henrichs, David. 2017. Unsplash. 10 02. Accessed 10 03, 2021. https://unsplash.com/photos/72AYEEBJpz4.

iStock. n.d. iStock. Accessed 11 17, 2021.

Kitwood, Dan. 2016. gettyimages. 02 11. Accessed 10 15, 2021. https://www.gettyimages.co.uk/photos/dan-kitwood-pollen?assettype=image&phrase=dan%20kitwood%20pollen&sort=mostpopular&license=rf%2Crm.

Mushroom. 2020. Pexels. 05 25. Accessed 12 14, 2021. https://www.pexels.com/de-de/foto/industrie-technologie-verwischen-geschaft-4485456/.

Paukshtite, Kristina. 2018. Pexels. 09 23. Accessed 12 10, 2021. https://www.pexels.com/de-de/foto/nahaufnahme-fotografie-von-apple-tree-1444630/.

Pixabay. 2016. Pexels. 12 23. Accessed 12 12, 2021. https://www.pexels.com/de-de/foto/computermonitor-aktiviert-text-anzeigen-270360/.

PollenPro. 2021. PollenPro. Accessed 10 11, 2021. http://www.pollenpro.net.

Results for Development. 2019. Artificial Intelligence and International Development. Results for Development.

Shahrubudin, N., T.C. Lee, and R. Ramlan. 2019. An Overview on 3D Printing Technology: Technological, Materials, and Applications. Procedia Manufacturing.

SONY ELECTRONICS INC. 2021. Sony. Accessed 10 21, 2021. https://electronics.sony.com/imaging/compact-cameras/all-compact-cameras/p/dscrx100m5a-b.

UFarmer S.r.l. 2021. UFarmer. Accessed 12 10, 2021. https://www.ufarmer.it.

Wolniak, Radoslaw. 2021. The concept of operation and production control. Poland: PRODUCTION ENGINEERING ARCHIVES.

World Economic Forum. 2021. Artificial Intelligence for Agriculture Innovation. World Economic Forum.

Yang, Xi, and Eijiro Miyako. 2020. Soap Bubble Pollination. iScience.

Bibliography

GO-TO-MARKET STRATEGY

Edo, Guillermo D. , interview by Maxim Herbosch. 2021. Interview Business Model (10 18).

European Commission. 2020. Eurostat. 10 30. Accessed 12 05, 2021. https://ec.europa.eu/eurostat/web/products-eurostat-news/-/edn-20201030-2.

Fonseca, Isabel, interview by Alica Ulrich. 2021. Interview Pollination Process (11 28).

Goldowitz Jimenez, Ilana. 2020. Gardening - Know How. 03 09. Accessed 11 15, 2021. https://www.gardeningknowhow.com/edible/nut-trees/almonds/how-are-almond-trees-pollinated.htm.

Medina, Arantxa. 2021. Tree Nuts Annual. Agriculture, Madird: United States Department of Agriculture - Foreign Agricultural Service.

Mendes, Ricardo Daniel, interview by Alica Ulrich. 2021. Pollination Interview (12 07).

Quentin, Collet, interview by Maxim Herbosch. 2021. Interview Business Model (10 15).

Science Learning Hub – Pokapū Akoranga Pūtaiao. 2014. Science Learning Hub. 02 02. Accessed 11 15, 2021. https://www.sciencelearn.org.nz/resources/99-pollinating-kiwifruit.

Statista Inc. 2021. Statista. 02. Accessed 12 05, 2021. https://www.statista.com/statistics/812434/production-volume-of-leading-kiwi-producing-countries/.

Surcica, Alex. 2014. PennState Extension. 02 28. Accessed 11 15, 2021. https://extension.psu.edu/pumpkin-pollinators.

WAPA Association. n.d. The World Apple and Pear Association . Accessed 12 06, 2021. http://www.wapa-association.org/asp/index.asp.

Bibliography

FINANCE & VALUATION

AgFunder. 2021. "AgFunder Farm Tech Investment Report."

Butzi. 2021. B. Accessed 12 05, 2021. https://butzi-speaker.com.

DJI. 2021. dji. Accessed 10 14, 2021. https://www.dji.com/pt.

Economic Research Institute. 2021. Economic Research Institute. 12 16. Accessed 12 17, 2021. https://www.erieri.com/salary/job/agronomist/portugal.

EIP-AGRI Service Point. 2014. "EU funding opportunities related to innovation in agriculture, food and forestry."

EOS. 2021. eos. Accessed 10 18, 2021. https://www.eos.info/en.

Europcar. 2021. Europcar. Accessed 11 26, 2021. https://www.europcar.com/en-us.

European Union. 2019. eurostat - Statistics Explained. 01. Accessed 10 14, 2021. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Agricultural_production_-_orchards.

Finerva. 2021. Finerva. 08 18. Accessed 11 20, 2021. https://finerva.com/report/agtech-alternative-protein-2021-valuation-multiples/.

—. 2021. Finerva. 12 02. Accessed 12 15, 2021. https://finerva.com/report/robotics-ai-2021-valuation-multiples/.

Finistere Ventures LLC. 2020. "2020 Agrifood Tech Investment Review."

Governo da República Portuguesa. 2019. República Portuguesa. Accessed 12 6, 2021. https://www.portugal.gov.pt/pt/gc22/area-de-governo/agricultura.

Inovisa. 2019. Inovisa. Accessed 12 9, 2021. https://inovisa.pt/en/.

Payscale, Inc. 2021. payscale. Accessed 11 15, 2021. https://www.payscale.com.

PollenPro. 2021. PollenPro. Accessed 10 11, 2021. http://www.pollenpro.net.

Quentin, Collet, interview by Maxim Herbosch. 2021. Interview Business Model (10 15).

Silveira, Nuno, interview by Maxim Herbosch. 2021. Interview Business Model (10 15).

SONY ELECTRONICS INC. 2021. Sony. Accessed 10 21, 2021. https://electronics.sony.com/imaging/compact-cameras/all-compact-cameras/p/dscrx100m5a-b.

Statista, Inc. 2021. statista. 02. Zugriff am 15. 11 2021. https://www.statista.com/statistics/530107/office-real-estate-prime-rent-lisbon-portugal-europe/.

—. 2021. Statista. 02. Accessed 11 26, 2021. https://www.statista.com/statistics/530107/office-real-estate-prime-rent-lisbon-portugal-europe/.

University of Illinois Board of Trustees. 2021. Appels and More. Accessed 10 21, 2021. https://web.extension.illinois.edu/apples/facts.cfm.

Bibliography

REGULATIONS & ROADMAP

European Union Aviation Safety Agency. n.d. EASA . Accessed 12 08, 2021. https://www.easa.europa.eu/domains/civil-drones/drones-regulatory-framework-background/open-category-civil-drones.

McAfee, Alison. 2020. The Problem with Honey Bees. 11 04. Accessed 11 20, 2021. https://www.scientificamerican.com/article/the-problem-with-honey-bees/.

Mendes, Ricardo Daniel, interview by Alica Ulrich. 2021. Pollination Interview (12 07).

PitchBook Data, Inc. 2021. PitchBook. 12. Accessed 12 05, 2021. https://pitchbook.com.

UK Civil Aviation Authority. 2020. "Civil Aviation Authority." Civil Aviation Authority. 12. Accessed 12 08, 2021. https://publicapps.caa.co.uk/docs/33/CAP2005_EU_Drone_Rules_Factsheet_V7%203.pdf.

—. 2020. "Civil Aviation Authority." Civil Aviation Authority. 12. Accessed 12 08, 2021. https://publicapps.caa.co.uk/docs/33/CAP2006_EU_Drone_Rules_Factsheet_V7%204.pdf.

APPENDIX

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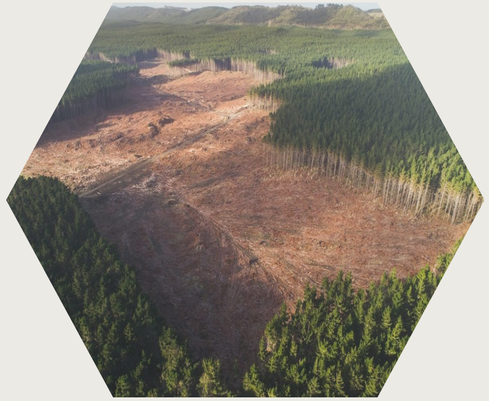
WHAT IS KILLING THE BEE?

PECTICIDES

DROUGHT



HABITAT DESTRUCTION

NUTRITION DEFICIT

AIR POLLUTION

CLIMATE CHANGE

(European Parliament 2021)

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BIGGEST PLAYERS ARE FOCUSING ON MULTIPLE BUSINESSES - I

Company	Overview	VC Raised	Only Ag Focused	Deal Type	HQ
XAIRCRAFT 极飞科技	Developer of Smart Agriculture Solutions including ag. drones and Unmanned Ground Vehicles	$246.2 M	√	Late-Stage	
CLEARPATH ROBOTICS™	Custom Robot Engineering Services	$82 M	×	Late-Stage	
PERCEPTO	Harnessing robotics for autonomous inspection	$64.2 M	×	Late-Stage	
FJDynamics	Robotics company focusing on automation, digitalization and green energy	$60.9 M	×	Early-Stage	
BLUE OCEAN ROBOTICS	Develop, produce and sell professional service robots	$57 M	×	Late-Stage	

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BIGGEST PLAYERS ARE FOCUSING ON MULTIPLE BUSINESSES - II

Company	Overview	VC Raised	Only Ag Focused	Deal Type	HQ
SOFT ROBOTICS	Designing and building soft robotic automation systems that can grasp and manipulate items of varying size, shape, and weight	$54.3 M	×	Late-Stage	
PLUS ONE ROBOTICS	Develops computer vision software to enable robotic automation	$43.6 M	×	Late-Stage	
HARVEST AUTOMATION	Develops robots enabling smarter production for growers by providing significant gains in productivity & efficiency	$33.6 M	√	Late-Stage	
TERRACLEAR	End-to-end solution for automating rock clearance	$31.6 M	√	Early-Stage	
ecorobotix	Provider of AI-based ultra-high precision farming solutions	$28.4 M	√	Late-Stage	

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CUSTOMER BASE ANALYSIS

To recapture:

DEMOGRAPHIC

- 25-60, Male
- Income between 11.000 - 27.000 EUR p.a.[1, 2]

TECHNOGRAPHIC

- Mobile
- Computer
- Tablet

VALUE-BASED

- Not given as no Data available yet.

GEOGRAPHIC

- Portugal
- Spain
- Italy

NEEDS-BASED

- Crop yield is decreasing
- Costs are increasing

INDUSTRY

- Agricultural

PSYCHOGRAPHIC

- Values respectability
- Part of stable community
- Good relationship to family members
- Traditional
- Religious
- Nature lover
- Interest in innovations
- Wants to sustain his job

BEHAVIORAL

- Valuable contributions to community
- Enjoying natural surroundings
- Being his own boss
- Providing future opportunities for his children
- Likes to catch a beer with other farmers in local pub

BUSINESS SIZE

- Medium to large-sized farms
- 40-150 employees

[1](European Commission 2019)
[2](European Commission 2019)

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COST OF HAND POLLINATION IN US $

Table 3. Comparison of pollination service values (to the Western Cape deciduous fruit industry; US$ millions for 2005) estimated using the replacement method with those derived from traditional methods using traditional or revised factors.

Valuation method	All insect pollinators	Managed pollinators	Wild pollinators	Ratio of wild to managed value
"Traditional"				
Total production value approach	501.0	378.3	122.7	0.32
Proportional (dependence) production value approach	358.5	312.2	46.3	0.15
Revised service value estimates based on experimental evidence				
Proportional (dependence) production value approach	338.3	119.8	218.5	1.82
Production value derived from pollination services	333.9	118.0	215.9	1.83
Cost of pollination (hive rental)				
Current direct cost	-	1.8	-	-
Estimated direct cost assuming managed honeybee substitution	4.3	1.8	2.6	1.44
Pollination service replacement value (income lost)				
Pollen-dusting	292.9	107.8	185.2	1.72
Hand pollination (method 1)	161.2	44.9	116.3	2.59
Hand pollination (method 2)	433.8	122.8	310.9	2.53
Hand pollination (method 3)	77.0	28.0	49.1	1.75

1.3 Graph - Retrieved from (Allsopp, de Lange and Veldtman 2008)

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THE SCIENCE BEHIND OUR SOLUTION

- Soap Bubbles are mechanically stabilized and withstand compression[1].
- Pear pollen grains demonstrate strong activity[2].
- Growth of fibrous pollen tubes, indicating successful pollen fertilization[3].
- Maximum success rate of 90% for the flowers of L. japonicum[4].

[1, 2, 3, 4](Yang and Miyako 2020)

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MULTIPLE CALCULATION

2028	
Revenue	EBITDA
€1 209 600	€437 862,73

Multiples	Agtech	Robotics&AI	Weighted	Valuation
EV/EBITDA	15,4	25,1	21,22	€9 291 447,11
EV/Revenue	2,4	5,9	4,5	€5 443 200
				€7 367 323,55

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POLLINATION CYCLE & GROWTH

Ha per drone (pollination cycle)		
days. In month	30	days
pollination period (months)	1	months
Pollination duration	30	days
working days	28	days
impossible condition to fly	6	days
Optimal fly days	22	days
flying hours per day	7	hours
hours to pollinate 1 hectare once	2	hours
number of times to pollinate 1 flower	2	times
hours to fully pollinate 1 hectare	4	hours
hectares per day	1,75	ha
hectares per pollination cycle (per drone)	**39**	

Year :	2022	2023	2024	2025	2026	2027	2028
greenhouse	0	0	0	0	1	3	5
portugal	2	2	8	11	14	17	18
spain	0	0	0	2	6	11	17
italy	0	0	0	2	5	9	14
Farms (clients)	2	2	8	15	26	40	54
Number of new clients	2	0	8	7	11	14	14
Average orchard size (ha)	28	28	28	28	28	28	28
number of Ha	56	56	224	420	728	1120	1512
price per Ha	800,00 €	800,00 €	800,00 €	800,00 €	800,00 €	800,00 €	800,00 €
Revenues	€0	€44 800	€179 200	€336 000	€582 400	€896 000	€1 209 600
New drones	2	2	2	5	8	9	8
Number of drones	2	4	6	11	19	28	36