Marketing report

-

Market study

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Summary

Introduction

In order to bring our product closer to the real world, we developed our project with entrepreneurship in mind and envisioned SofterShock as a startup company that can provide an effective solution in order to protect vineyards from extreme temperatures. We engaged the French champagne producing community, the French Wine and Vine Institute, and oenologists for guidance in creating a profitable business model for our products.

I) Market analysis

A market analysis was performed in order to assess whether our product Softer Shock can provide a better option for farmers in the prevention of freeze, dryness and the effects of global warming.

1) General context

A) The current context of climate change

Global warming is now indisputable. Since 1870, global temperature has increased by 0.8°C and the last decade has been the hottest ever (Figure 1).[1] The biggest changes that we see today are increased rainfall or more intense droughts all around the world. It affects the life cycle of plants but also of glaciers, whose extent decreased by 5% between 1966 and 2005.[2]

[1] Réseau action climat France, Changement climatique : comprendre et réagir, 2011.
[2] Réseau action climat France, Changement climatique : comprendre et réagir, 2011.

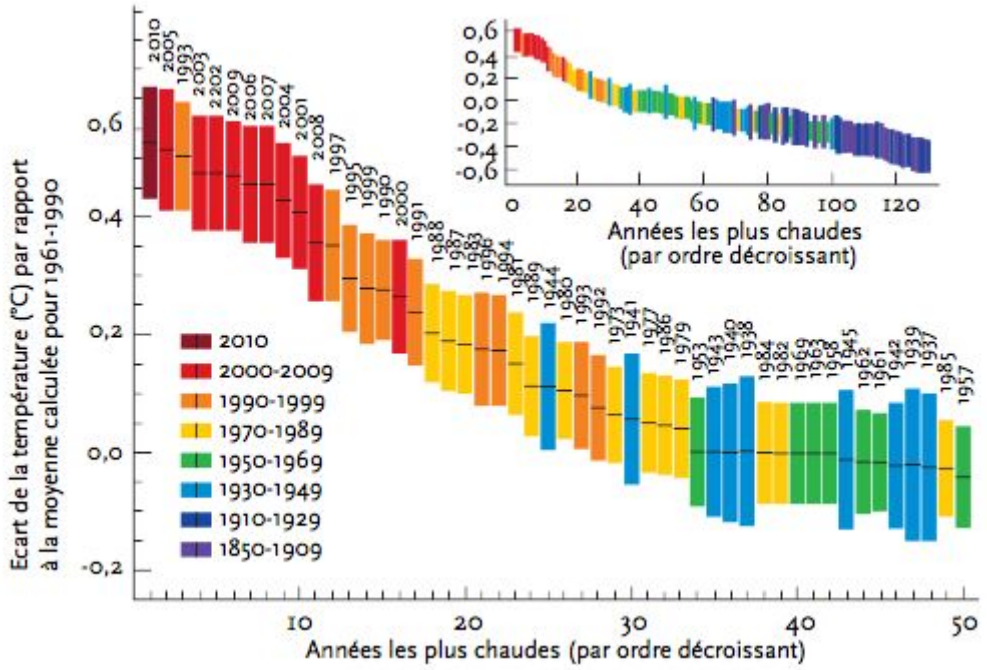


Figure 1 : Graph representing the world ranking of years according to their average temperature (since 1850).

Today, annual fossil-fuel emissions are around 7 billion tons of carbon. For 2050, the emissions are estimated to be 16 billion tons of carbon, and even more by 2100, when the total fossil-fuel emissions are estimated to reach 29 billion.

Some studies showed that by the 2080s, the six climate models will suffer from an increase of temperature around 5°C for land area and about 4.4°C for farm areas. [3]

B) The climate change affecting the agricultural field

By the 2080s, the global food demand is expected to triple due to the higher world population and higher incomes (see figure 2). However, the agricultural world is the most concerned by global warming. Currently, each crop species is grown in a specific area in which they are exposed to the optimum temperature for optimal growth and reproduction. As temperatures increase over the next century, the optimal growth of plants will be affected, decreasing the yields of grains and fruits according to current geographic farmland allocations.[4]

[3] Cline R William, Global warming and agriculture, Finance & Development, March 2008
[4] Walthall Charles L and al, Climate Change and Agriculture in the United States : Effects and Adaptation, United States Department of Agriculture, 2013

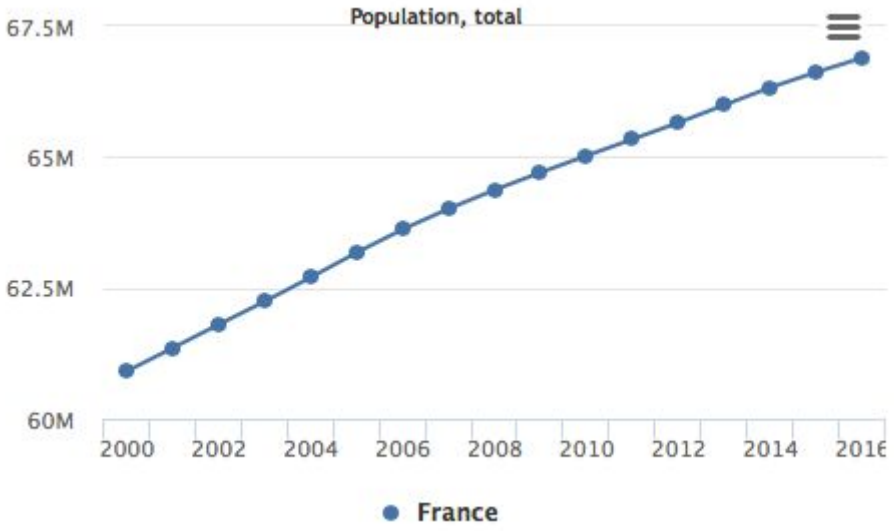
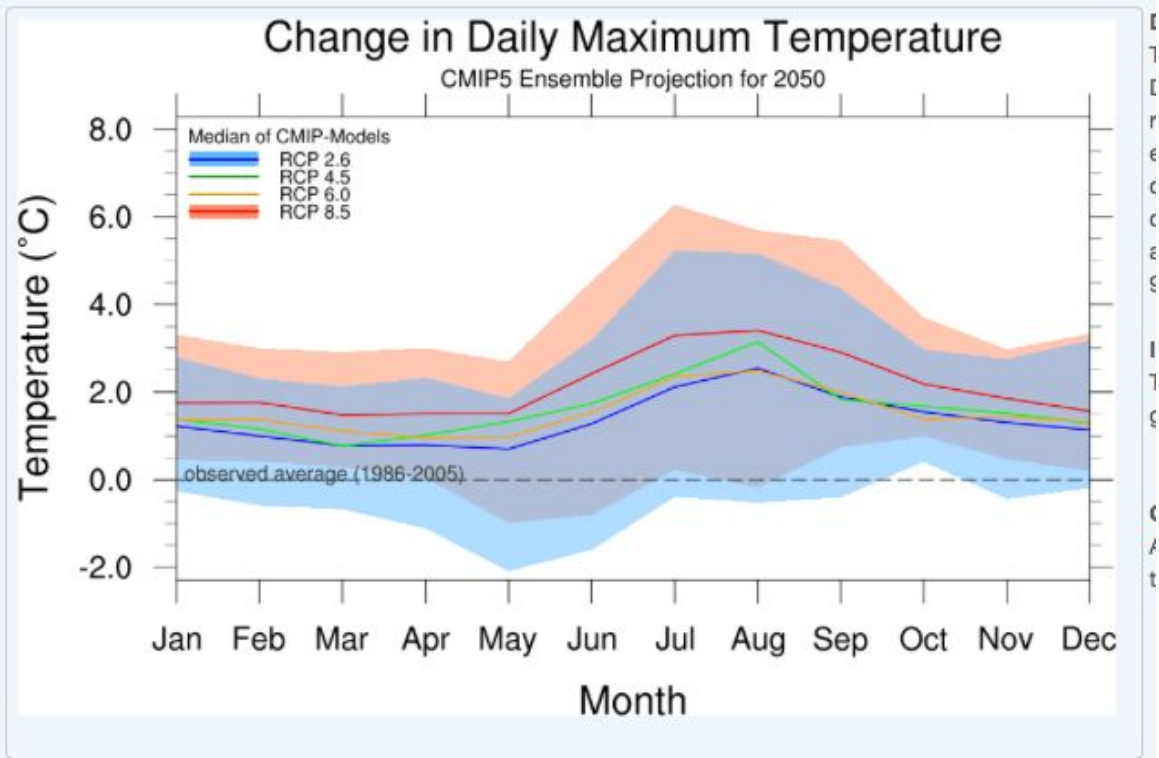


Figure 2 : This graph shows one factor (growth of the population) affecting climate change specifically in France but the trend is the same all around the world. Climate change official portal, the World Bank Group available on http://www.worldbank.org/en/topic/climatechange

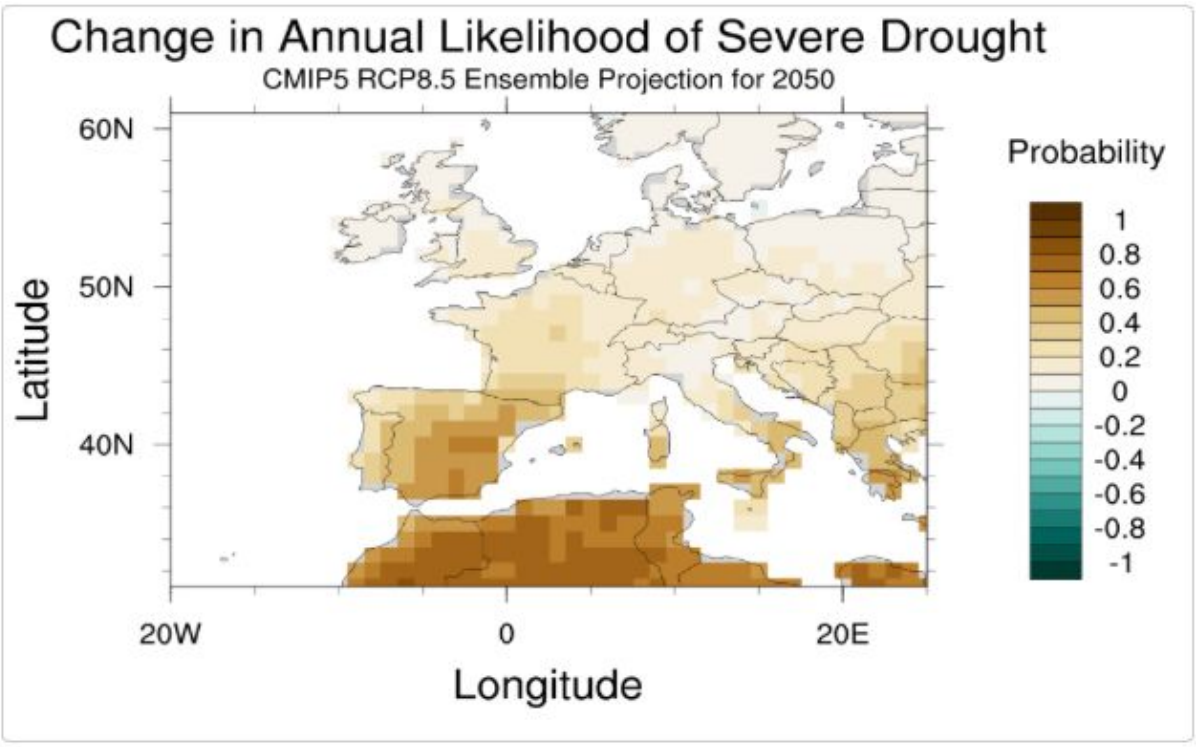
The exposure of irrigation, crop and land management, and livestock to climate change increases at the local and regional scale. Climate change is enhancing the risks, acting as a threat multiplier, particularly regarding the availability of water and the changes of temperatures. In many places, climate change is manifesting as higher variations in moisture, increases in drought and flooding conditions.[5]

[5] Climate change official portal , the world bank group available on http://www.worldbank.org/en/topic/climatechange



This graph shows projected change in Monthly Mean of Daily Maximum Temperature by 2050 compared to the reference period (1986-2005) under all RCPs (representative conservation pathway) of CIMP5 ensemble modeling (earth system model). The positive values show that warmest daily maximum temperatures will likely to increase compared to the baseline.[6]

[6] Climate change official portal , the world bank group.



This map shows change in projected Annual Likelihood of Severe Drought by 2050 compared to the reference period (1986-2005) under RCP 8.5 of CIMP5 ensemble modeling. Brown/Yellow areas are more likely to experience severe drought compared to the baseline period.[7]

Faced with these changes, ensuring food security for all is a major global challenge. Farmers will have to adapt to new contexts.

C) Climate change: Which wine for tomorrow?

The observed warming over the last 50-100 years in wine-making regions has benefited some areas by creating more suitable conditions while others have been challenged by increased heat and water stress.[8]

The influence of climate change on vines and wines is an issue that the world has been addressing for several years. It is important to know how winegrowers will be able to adapt and what are the scenarios for the French wine regions in the future years.[9]

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[7] Climate change official portal , the world bank group.
[8] Jones G.V, The state of the Climate : Trends, Projections, and Relationships to Viticulture and Wine Production
[9] INRA Science & Impact, Changement climatique : quel vin demain ? , dossier de presse, septembre 2013.

However, climate change affects vineyards all around the world such as in California where the vineyard water use for frost damage prevention has resulted in significant flow reduction in California streams. Climate change can also bring precipitation decrease, increasing the need for irrigation, which may result in impacts on freshwater ecosystems.[10]

In 2050 the area suitable for viticulture will decrease by 19% to 73% in the major wine producing regions.

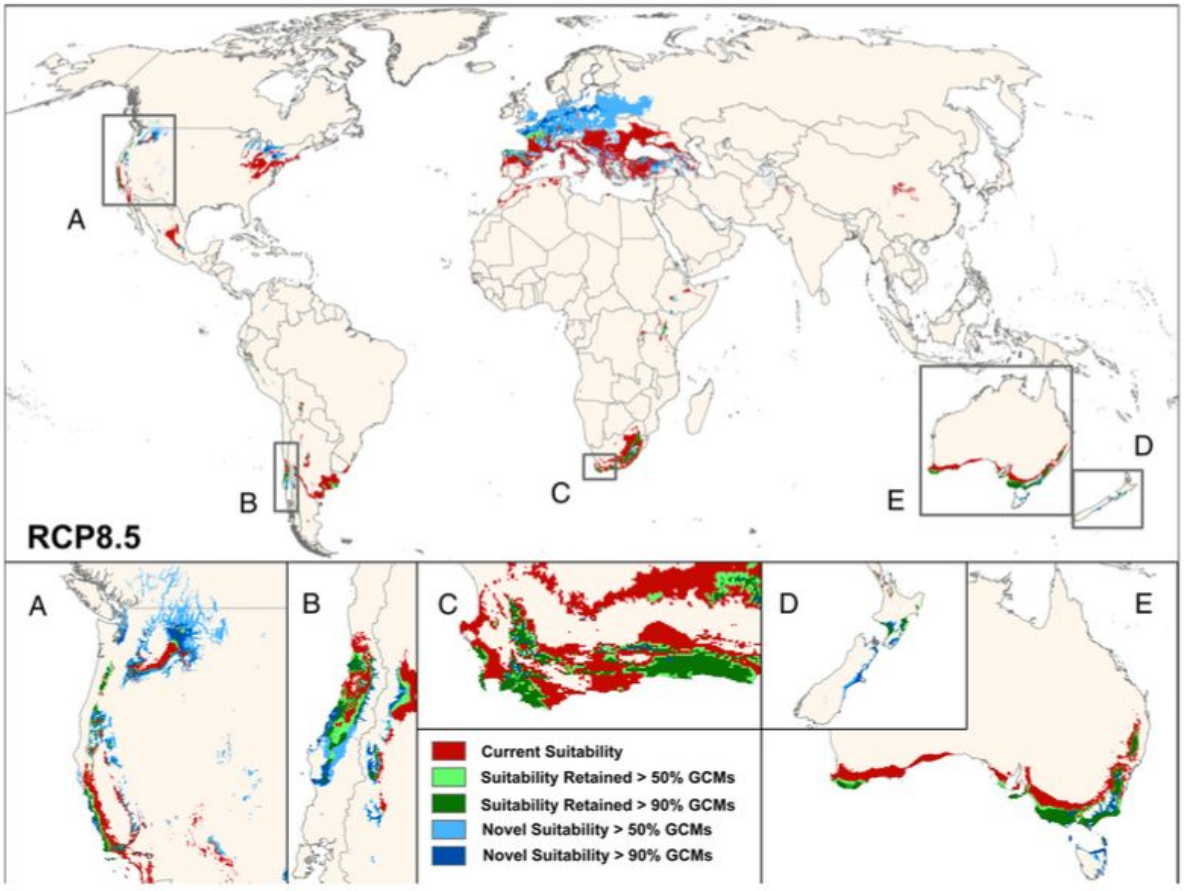


Figure 3 : Maps representing changes in viticulture suitability between current (1961–2000) and 2050 (2041–2060) . They used the consensus of multiple wine grape suitability models representing a range of modeling approaches driven by 17

[10] Hannah Lee and al, Climate change, wine, and conservation, PNAS,2013

global climate models (GCMs) under one Representative Concentration Pathways (RCPs). [11]

A project to understand the impact of climate change on vines

In March 2012, the French National Institute for Agricultural Research (INRA) launched a multidisciplinary project bringing together 23 research laboratories around these priority issues.[12]

This program called LACCAVE (Long Term Impacts and Adaptations to Climate Change in Viticulture and Enology), examines the main effects of climate change on vines and wines and explores innovations and adaptation strategies.[12]

Some consequences

Over the past thirty years, global warming has led to an advance in the entire vine growth cycle, from flowering to harvesting.Today we harvest between two and three weeks earlier than thirty years ago. The berries are sweeter and less acidic, which leads to wines with more alcohol and less acidity.[12]

In the south of France the major consequences would be reduced yields and more concentrated wines, including alcohol content. In the northern areas the maturation of grapes would be favored, resulting in changes in the aromatic profiles of the wines.[12]

[11] Hannah Lee and al, Climate change, wine, and conservation, PNAS,2013
[12] INRA Science & Impact, Changement climatique : quel vin demain ? , dossier de presse, septembre 2013.

The two graphs below show the consequences of climate changes on the harvest dates and the the evolution of the temperature in the Beaujolais vineyards. We can see that there are dramatic changes since 1970.

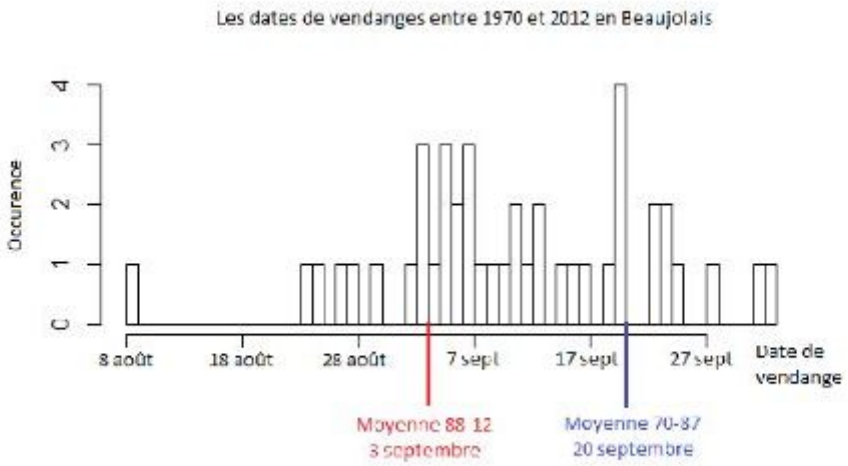


Figure 4 : Graph representing the harvest dates in the region of Beaujolais between 1970 and 2012.

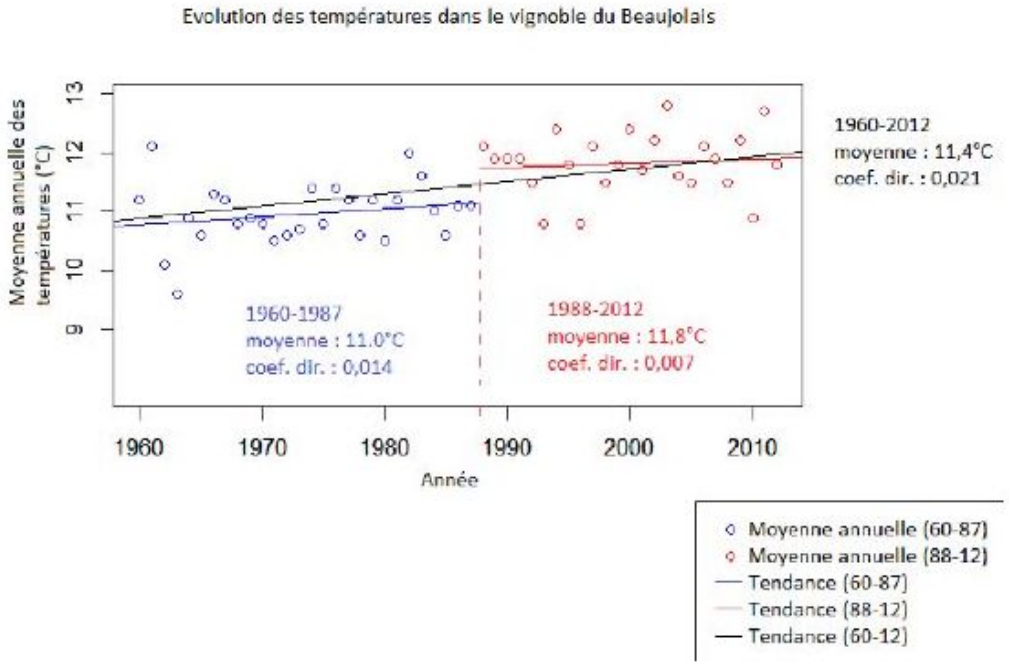


Figure 5 : Graph representing the evolution of temperatures in the Beaujolais vineyards between 1960 and 2012.

2) Global wine market in France and Europe

In 2016 wine was the **2nd largest** French export sector, which means the exports are much higher than the imports. This market is worth €10.4 billion. The largest French export sector is aeronautics, representing more than €22 billion in trade surpluses.

In 2016, the value of exports is estimated at €7.9 billion. But France also remains the **first market** with 60% of the wine consumed.

Viticulture is the **first agricultural sector** in France with 558 000 employed in the wine-making sector, including 142 000 winegrowers.

The area of vineyards grown in France is 750 000 hectares, or nearly 10% of the world vineyard area. France produces nearly 16% of world's wine and ranks **2nd** in terms of **world producer** (43.5 million hectolitres) between Italy (50.9 million) and Spain (39.3 million).

Regarding internal demand, 85% of French households buy wine for their annual consumption. 51% of people drink some wine occasionally, 33% are not consumers and 16% are regular consumers (almost every day). France is the **2nd largest** consumer of wine in the world after the USA and before Italy.

At the European level the wine sector represents 47% of the world's vineyard surface. 3 countries - France, Italy, and Spain - account for 74% of the European area and more than one third (34%) of the world vine surface. As the **world's first producer** in volume and **first exporter** in value terms, Europe is also the **first consumer** with 62% of global consumption, compared to 24% in the USA and 12% in Italy.

The USA is the largest foreign market for European wine, followed by Germany and UK.

3) Survey analysis : France

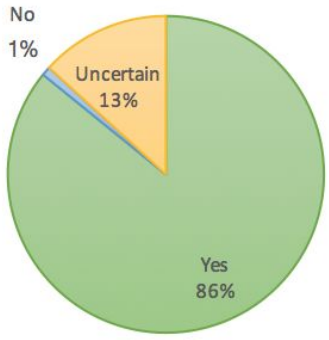
Total number of answers: 219 (as of 10/13/2017)

The goal of this survey is to understand the population's point of view regarding GMOs in general, and our "Softer Shock" iGEM project that intends to use GMOs on crops. This study is here used to get the French opinion about our project.

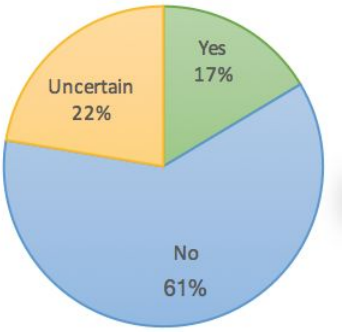
12 out of 23 questions were selected for this survey analysis. Below are shown the results related to the public perception of GMOs and our iGEM project. We have benefited from the help of other French teams that have shared the survey to their families and friends.

In France, people have a generally negative view of GMOs. Even if 86% of the population is aware of what a GMO is, still 61% and 78% think it is not safe for health and for environment. We also notice 13% are uncertain about what a GMO is. This means that a significant proportion of the French population is not sufficiently aware of this subject.

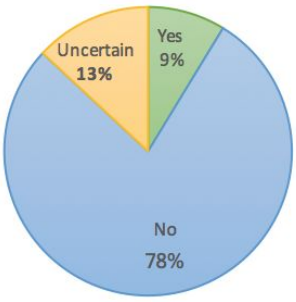
Do you know what is a GMO?



Do you consider GMOs safe for your health?



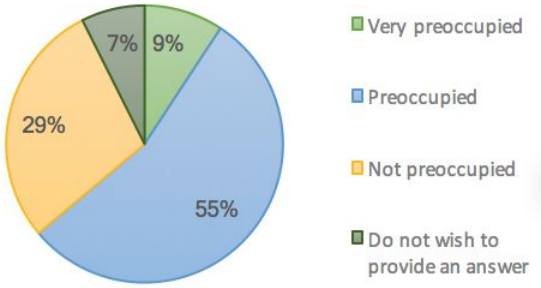
Do you consider GMOs safe for the environment?



These 2 results show that people think GMOs are less safe for the environment than for their health.

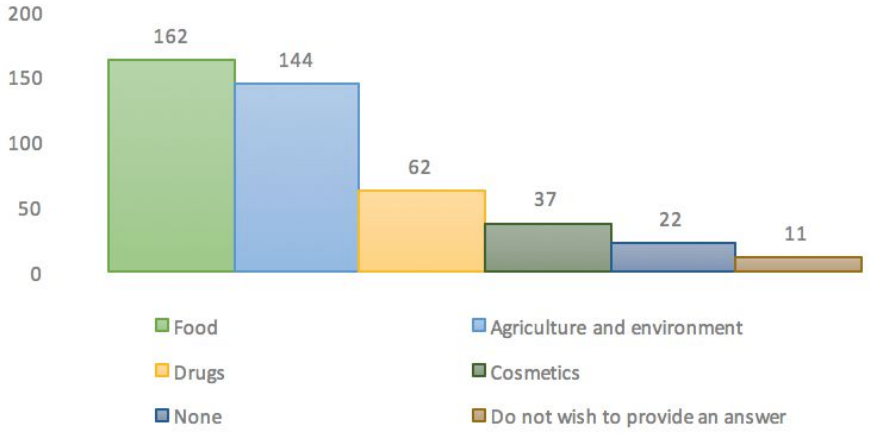
Regarding our iGEM project, we wanted to know how concerned people were but also if some specific GMOs application sectors were a real cause for concern. It seems that 55% of our respondents feel worried about GMOs which is in accordance with the health and environment safety answers.

What is your degree of preoccupation concerning GMOs?



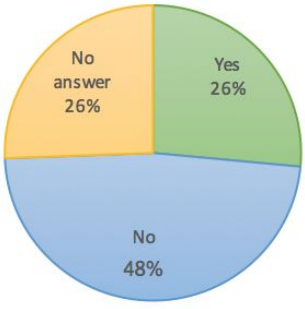
As shown below, the food and agriculture and environment fields are the main concerns, which are exactly our application domains. We thus know that our product could have difficulty being accepted by the French population.

In which sectors are you preoccupied by the eventual presence of GMOs?

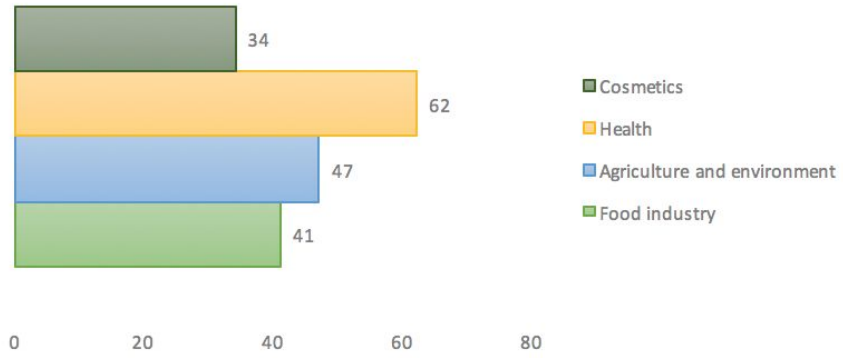


Then, we focused on the people's investment regarding the support and development of GMOs. There is a majority of negative answers (48%). To investigate the reasons why they were for or against we proposed 2 different answers. For the people involved, we offered them the possibility to select the different domains they were interested in. And for people against, they had to select a reason to their decision.

Do you support the use or the development of GMOs?

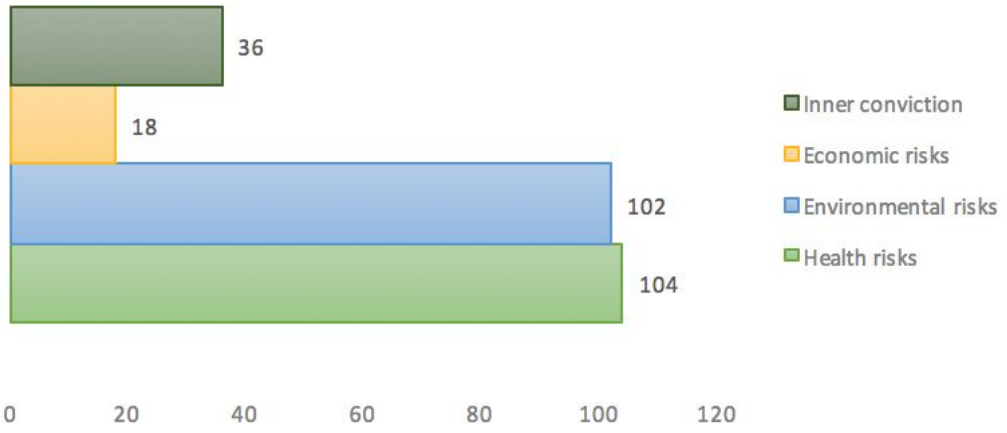


If yes, in which domains?



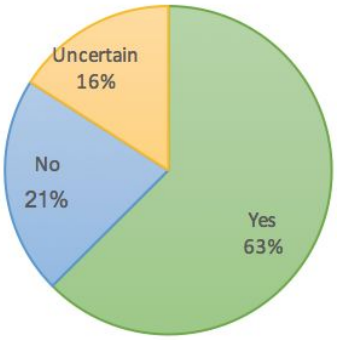
Health is the main domain people are following in terms of GMOs development and use. One hypothesis could be that nowadays the health sector is more developed dealing with GMOs than others.
But as seen below, it is also the highest risk underligned by respondents with environmental risks. Health here is not seen as the application domain but more as the health risks humans can have due to GMOs use.

If not, why ?



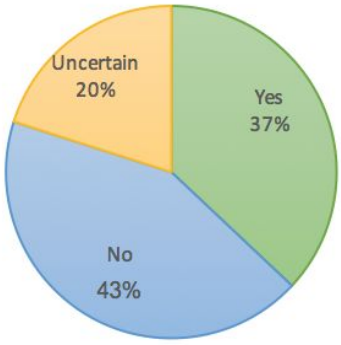
The next part deals directly with our project. The aim was to know if people would agree to use our product in their country to fight climate change. Firstly, we asked them about the climate conditions in their country and if the crops were suffering from global warming. 63% of respondents think France is highly concerned by global warming.

Do you think agriculture in your country suffers from global warming?



Secondly, we introduced our project to know if people would accept the use of a GMO product to protect the crops from bad climatic conditions. For this question, the answers were very balanced with 43% of negative feedbacks and 37% of positive feedbacks.

Would you be in accordance with the use of GMOs on crops in your country to counter the effect of global warming?



This comes with the first conclusion we had before, that our product will likely not be accepted in France.

In **conclusion**, our “Softer Shock” product **might struggle** to find its place in France.

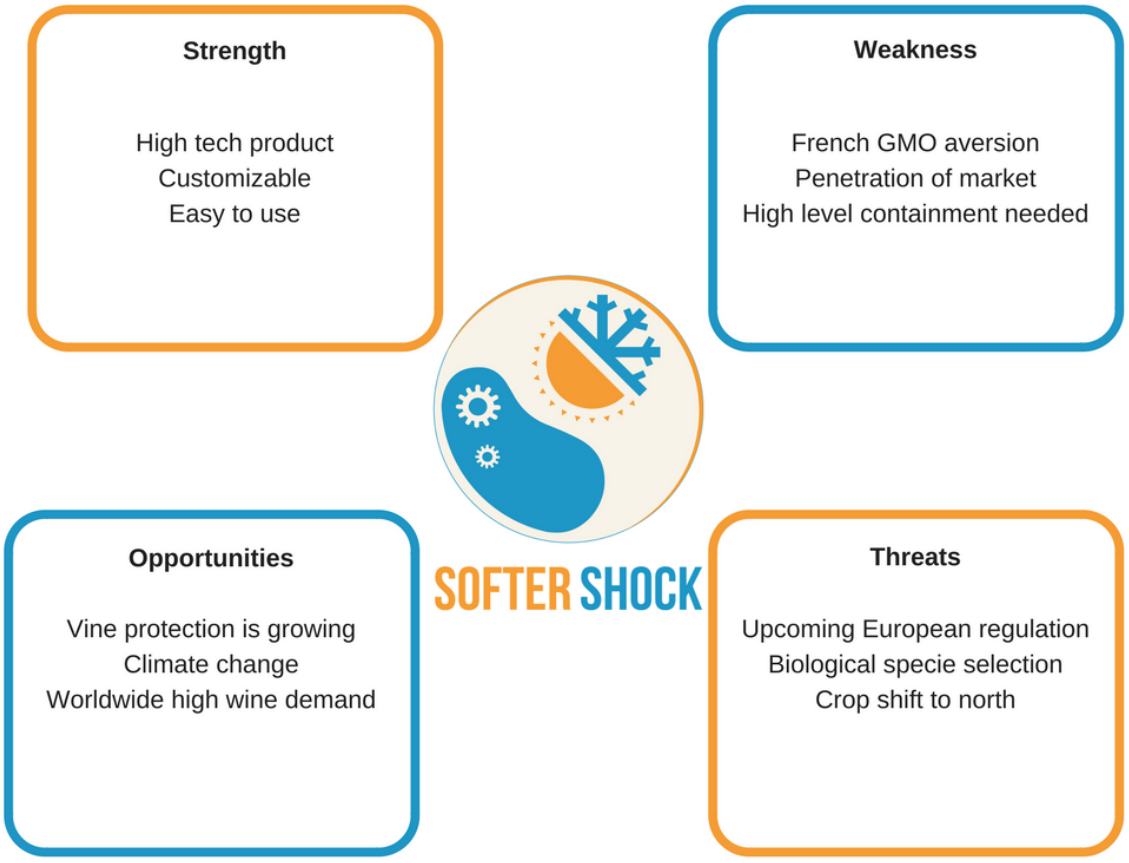
This may be supported by several results:

- 78% of the population that think GMOs are **not safe** for the environment
- 144 out of 219 (65.75%) people **were concerned** by the eventual presence of GMOs in agriculture or environment

And finally, 44% of respondents are **against the use of GMOs on crops** to protect them from harsh temperatures.

II) Market segmentation, target markets, and positioning

1) SWOT analysis



2) PESTEL

Political
Softer Shock uses genetic engineering technology and is therefore subject to French and European regulations. These regulations are very strict, particularly in France. It must comply with the 2001/18/CE law which concerns GMOs used for commercial purposes.

Economic
France remains the **largest consumer market**.

Social

Wine consumption is a cultural and social habit in France, but also throughout the world.

Technological alternatives

Existing technologies for mitigating heat damage includes : potassium polyacrylate, Biodisac, fans, and cultivar selection. For frost damage mitigation, competing technologies include PEL 101 GV®, the sprinkling method, and Frostbuster, as well as helicopter use and field-deployed heating systems.

Environmental
Softer Shock is directly linked to the challenges of climate change and environmental policies

Legal
Environmental laws changing

3) Direct and indirect competition

A GM crop with genetic hot and cold snap protection doesn't exist yet, nor does a product similar to ours.

Current protection against heat damage

Name	Advantages	Drawbacks	Comments	Cost
Variety selection (non GMO)	-Naturally resistant to heat strokes -Less investment in machinery	-Decreases vine biodiversity	-Indirect competition	
Fan	-Automatic triggering - protection of 4 hectares	-Noise	-Indirect competition	30 000-33 000€ depending on the engine type (Gasoline and diesel)
Potassium polyacrylate	-Limit water use -lifetime of 10 years -Biodegradable -50L of water in a quarter instead of 80L in a week -Non toxic	-Decrease the cation exchange capacity of the soil	-Indirect competition -25Kg for 1 ha -Can store 500 times its weight in water -Mix to ground	25 Kg = 400€
Biodisac	-Avoid heat strokes -lifetime of 3 years maximum -Biodegradable	-Do not protect buds directly	-Indirect competition -3 different sizes	200 bags for 50€ in average

Current protection against cold damage

Name	Advantages	Drawbacks	Comments	Cost
Variety selection (non GMO)	-Naturally resistant to heat strokes	-Decreases vine biodiversity	-Indirect competition	

	-Less investment in machinery			
Wind turbine	-Automatic triggering - protection of 4 hectares	-Noise	-Indirect competition	30 000-33 000€ depending on the engine type (Gasoline and diesel)
Paraffin candles	-8-12h of autonomy	-Release of CO_2 -Expensive solution -Not effective at 100% -No protection of the whole vineyard	-Indirect competition -300 candles can be needed for 1ha	5.5€-8€/candle + workforce
Helicopter	-Efficient solution	-Air pollution -Noise -Expensive solution	-Indirect competition -Made by professionals	170€/ha/hour
Heating wires (cables)	-Protection of buds -Around 95% of protection insurance -Automatic activation		-Indirect competition -Activation at 4°C with a T°C of 28°C in average.	The installation of cables is around 35 000€/hectare. Running cost is relatively low: 400-500€/year/ 1.5 hectare.
Frostbuster (by Agrofrost)	-5-7 ha of protection -Long lifetime -Easy use -Up to 93% protection	-Noise -Air pollution (gas turbine)	-Indirect competition - Different product and price ranges	18 500€ HTC/5-7 hectares, gas turbine
Sprinkling method	-Use for irrigation -Very efficient technique	-Intensive use of water to form ice crystals around the plant -Very costly -Destroys soils -Risk of ice formation	-Indirect competition -If necessary, supplementary costs to reinforce the system	Around 7 600 - 9 000€ (source: Champagne vineyard interviews)

PEL 101 GV®	-4-5 days of protection -50% of protection at -3°C	-Low efficiency below -3°C -Precise use conditions	-Indirect competition -Up to 4 application per year -Application 12 to 48 hours before frost -recommended water volume 100 L/ha -Apply in the morning with a relative humidity > 60%	en attente de l'appel de Marie à Elicityl et Zoé rencontre avec les vignerons

4) Our target: Wholesalers and winemakers

Who are our product users?

B to B strategy : We will sell our product to wholesalers that will then sell it to winemakers.

What is their typology?

1) Intermediate: wholesalers
2) Final users: Winegrowers, Males (more and more feminised). Consumption habits: pesticides and other protection means.

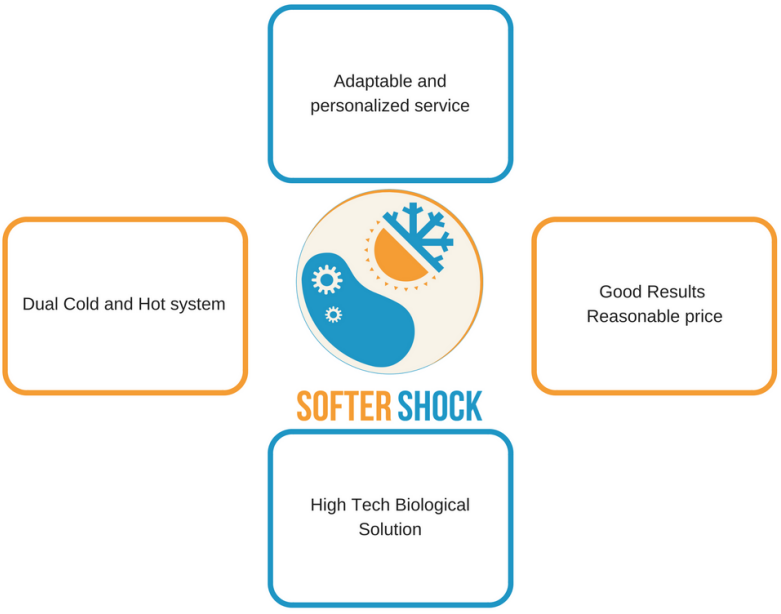
Age average of the winemakers: 45-50 years old.

Who is paying for the product ?
1) Wholesaler
2) The winemaker

Is there a particular buying season?

Winter (special prices from wholesalers) or before spring (end of March).

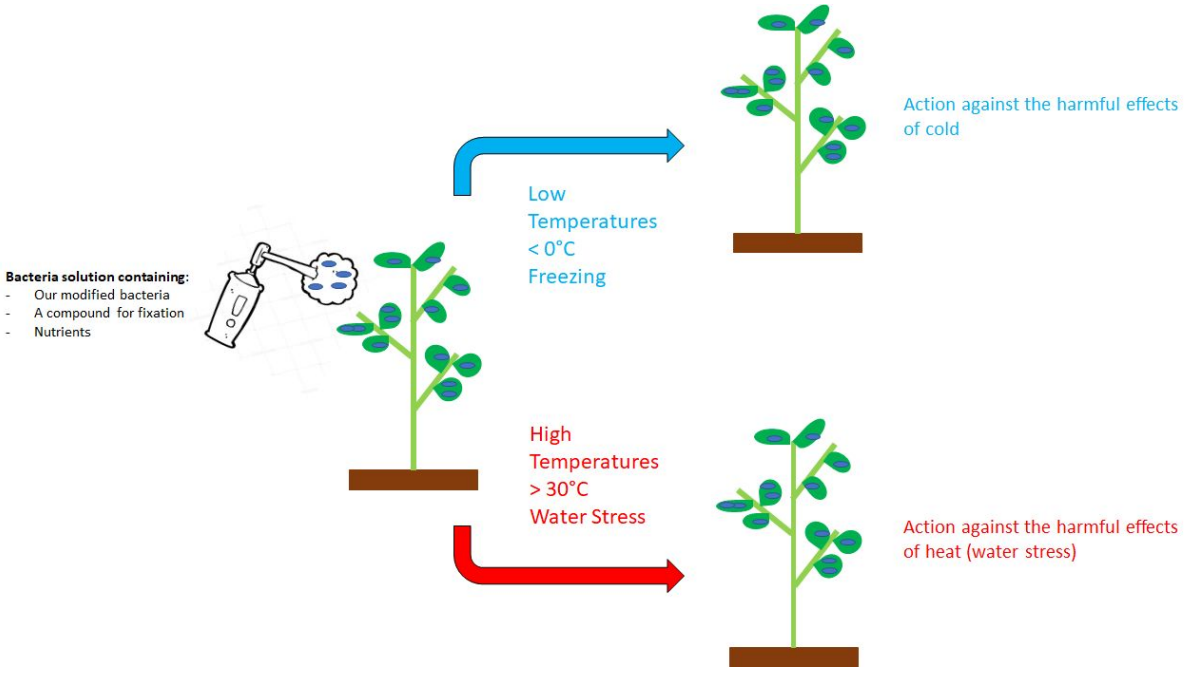
5) Positioning



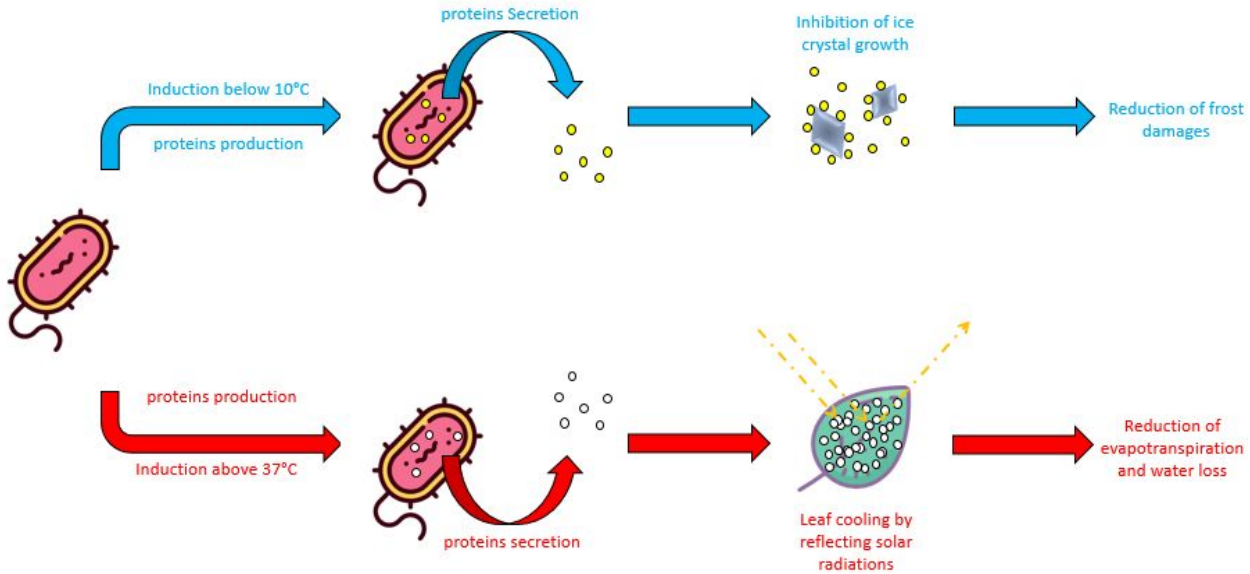
Softer Shock is a high tech solution that is adaptable and should offer good results with a reasonable price. It is the only system that is able to tackle issues with warm and cold temperatures while being fully customizable. Softer Shock is positioned as a biological solution, whereas current solutions are based on chemical or physical processes.

III) Marketing mix

Our product



Bacteria level



1) Price

The Softer Shock product can offer great value in terms of crop protection, ease of application, and low maintenance costs. As farmers are already suffering from high

production costs, high competition, and low profits, they are very sensitive to the price of climatic protection technology.

First winemaker offer: 2.6€/ha/use
2nd winemaker offer: 300-400€/ha in general

2) Product

Customers need a product that will save their crops. Our solution will protect the latter from both drought and frost while also reducing water consumption. It will be used directly on the targeted plant, applied from a dispersion device.

3) Promotion

Advertisement for Softer Shock will be done through symposiums and fairs for scientists and farmers.

4) Place

Clients will look for our product by contacting or visiting agricultural cooperatives, which are organizations where local farmers gather to produce and sale wine, and wholesalers.

IV) Business canva

<table>
<tr>
<td rowspan="2">Key partners

Supplier:laboratory

Key resource from partner:

-Farms
-Insurance companies</td>
<td>Key activities

Selling GMOs and its range

Personalization of biological tool

Marketing</td>
<td rowspan="2">Value Proposition

GMO 2in1 system against frost and dryness

- Better yield
- Ease of use
- Same product throughout annual temperature events
- Avoid the use of genetically modified plants
- Avoid vines delocalization and respects AOC
- Lower water consumption
- “On-demand” microorganism extinction
- System autonomy as long as the synthetic amino acid is added
- Automatic response to meteorological events → no need to monitor</td>
<td>Customer relationship

Personalized protection through metagenomics</td>
<td rowspan="2">Customer Segments

Farmers

Wine growers</td>
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<tr>
<td>Key resources

Laboratory material

Metagenomic tool</td>
<td>Channel

Cooperatives
www.softershock.com</td>
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<tr>
<td colspan="3">Structure cost

Laboratory expenses
Equipment
Salaries/ comission</td>
<td colspan="2">Revenue Streams

400$/hectare</td>
</tr>
</table>

Sources

Sources II) Global wine market in France and Europe

French key numbers about wine: http://www.vinetsociete.fr/se-mobiliser-pour-le-vin/chiffres-clefs-de-la-filiere-vin

Most important sectors of importation in France: http://www.francetvinfo.fr/economie/commerce/exportations-le-classement-des-secteurs-ou-la-france-excelle_1308875.html

Numbers for the second producer worldwide: http://www.lemonde.fr/economie/article/2017/06/17/en-france-le-marche-du-vin-inonde-par-la-production-low-cost-espagnole_5146195_3234.html

European key numbers about wine: http://www.vinetsociete.fr/magazine/article/les-chiffres-clefs-du-vin-en-europe