SynthetINK

Environmentally Friendly Pigment Production Business Plan

Lethbridge High School iGEM 2017

Executive Summary

Pitch

SynthetInk is a business that will create pigments that can be used for ink as well as nearly unlimited other applications. The business aims to produce pigments at a lesser environmental impact and a smaller cost than current ink production methods. This will be achieved by producing the pigments in bacteria using synthetic biology and protein expression. The researchers involved have found pigments that can be produced in the bacteria *Escherichia coli*, which can then be made safe for use after the pigments have been synthesized inside the cells then extracted from them. This will be accomplished by inserting the genes for the pigments into a carrier which will then be put into the cells. The cells will then be grown, will read the gene sequences and produce the pigments, which will be made safe. This process of killing the living bacteria is called purification, and this will allow the pigments to be extracted and incorporated into solvents to create ink.

The way that this company will generate profits is through our safe and non-harmful environmental practices and the marketing of this aspect. This is due to the fact that the cells' can be grown and maintained with the production of very little byproducts and once the genes for the pigments are produced, and the only cost will come from running the incubators for proper growth temperature, providing nutrients for the cells, and the purification, as well as the additives for the ink. The main focus is the production of the four pigments that correspond to the colors in ink cartridges: black, cyan, magenta and yellow, which can then be incorporated into an ink.

HP 60 printer ink, one of the world's most popular ink cartridges in 2012 (no longer sold by HP), cost $5544 by the litre, roughly 5000x the price of gas at the pump (black ink, price rises by $100 when referring to coloured ink). For one gallon of ink, you could also afford 6.4 gallons of the 2012 edition of Château la Fleur Petrus, which currently sells for approximately $3000 CAD per bottle, which is 1.5 liters. Numbers like these are what SynthetINK focuses on when referring to the great upsides of their synthesized inks.

At SynthetINK, the company not only understands the need for a cheap, environmentally friendly ink product, but also that consumers need an ink product that can replace their current go-to product, while still fulfilling and surpassing the quality they are used to. The solution to this problem is something that the company strives for with their synthetic inks.

Opportunity and Application

Currently, the ink and colorant industry is a global market with a variety of applications and products that are consumed worldwide. The company SynthetINK has an opportunity to be the pioneer of a new method of pigment production. Due to the product's large potential upside in comparison to conventional ink products, most importantly cost and environmental responsibility, the Synthetic Ink would be a very attractive buying option for large companies with the financial and spacial capacity to upscale the product's production, with a license. Looking to the future, this product has the potential to be very competitive with current products on the market, with the proper backing and interest.

Large companies, such as Hewlett-Packard, currently do not focus on the harmful environmental impact of their products. They only focus on appeasing those concerned about environmental harm by creating mass recycling plans for their sold cartridges. SynthetINK's goal is to attack this problem at its source. Our bacteria strains are not harmful to the environment or us, and the waste is very easy to dispose of. The costs of said bacteria are generally inexpensive (allowing for easy mass-production and swift production) and are non-pathogenic, meaning they would not infect a host if somebody were to come in direct contact with live cells (there will not be any bacteria or residue in the final product). That being said, there has always been a public stigma associated with the name *E.coli*, and consumers may make second-thoughts when they first become aware of the production methods.

SynthetINK plans to tackle the roadblock that is public opinion on GMOs and *E.coli* by strongly marketing the environmental benefits posed by the pigments, as well as educating consumers on the harmless nature of our GMOs and *E.coli.* These, in combination, will be very effective in convincing consumers of the benefits of purchasing these products

This company aims to solve the problem of ink prices and harmful production methods--two problems which have little to no progress towards solutions. The cost of ink will be decreased by growing pigments in bacteria, which will also have no harmful byproducts. Current production methods of colorants and ink by existing companies create many harmful byproducts and are expensive to create. Most are products of combustion or created from the destruction of plants. SynthetINK will avoid both problems because of the usage of bacteria to produce natural pigments. The application of synthetic biology provides a very viable solution.

Consumers will enjoy the same versatility of the ink that they currently experience with their pre-existing product. The synthetic ink will be a suitable substitute for current inks and associated products, such as toner. Companies which use inks for packaging purposes will also be able to use the product, as it provides them with a cheaper means of packaging, as well as effectively reduces their environmental footprint, making their product more appealing to a public audience.

Advertising companies, as well as companies that depend on ink to present their material, such as newspaper outlets, would benefit greatly from the synthetic inks. It provides a cost-effective, environmentally safe product for mass production of their goods, maximizing profit in the area of supply.

Even prior to initial production, SynthetINK has already received licensing interest from a large biotechnology company, Amino Bio Labs. Once production begins, we plan to start preliminary negotiations with the company.

Business Details

SynthetINK produces pigments in the bacteria *Escherichia coli*, using many genes from the environment, in the colours cyan, magenta, yellow and black. These pigments, or colorants, are purified, then combined with solvents and resins to produce ink. The components will all be natural and the ink synthesized in our own labs, which led to the company title of SynthetINK.

SynthetINK is a company composed of high school students from Lethbridge, Alberta, Canada who founded the idea for the company while preparing for competition in the synthetic biology competition, iGEM (international Genetically Engineered Machines), with the guidance of university of Lethbridge student-advisors, as well as a lab instructor, also from the University of Lethbridge. The idea of Synthetic Inks produced in the bacteria *Escherichia coli* is now evolving from a concept into a prototype, eventually ready for real world application.

SynthetINK has a goal of licensing their product to larger companies who have the means and interest to upscale the production of the product. In the bigger picture, the company hopes for use of the Synthetic Inks in homes, by advertising companies, and by printing companies. We plan to accomplish this by selling our prototype as well as production methods to a company that will be willing to upsize and produce the pigments at an even lower cost.

This is the company's first and only current business venture, allowing them to focus solely on the task of producing pigments for ink creation. Eventually, due to the group being composed of students who still have a large amount of time yet remaining in their education, the company will be forced to disband after some years. That is why the goal is to license their products prior to that happening, so that the personnel can pursue any future opportunities that they may want to.

Marketing and Sales Strategy

SynthetINK has a very broad target audience. The ink can be used privately in homes or commercially in advertising or packaging for companies who would prefer to have their products displayed to their consumers with cheap, environmentally friendly printing material. Synthetink's initial target audience will be large ink companies looking to change their landscape by buying and adopting a more natural, organic based product. Another target audience is companies in the related industries (such as advertising) who is interested in using this type of product to simplify their own manufacturing processes, or even moving fully into the ink industry by buying the products, where production would be greatly upscaled to meet pending demand.

Current consumers of ink would likely express great interest and desire to obtain a more affordable, and environmentally conscious product for their printers, as it is a much more convenient option. As well as many consumers will see the benefit of using an environmentally friendly ink as it can be used to show other customers that the business cares about the environment.

Preliminary inquiries will be done with companies that can act as a strong conduit for SynthetINK. Their interest in the product will determine future collaborations and/or deals, which would ultimately end in the licensing of the Synthetic Ink likeness for the prospect of profit coming from royalty payments.

SynthetINK plans to perform an initial presentation/pitch for potential buyers which will showcase the value of a license to mass produce the product, first-hand. A prototype of the Synthetic Inks will be used in a demonstration, as well as describing both the cost and environmental upsides to using the inks. All of these in combination would be the sum of SynthetINK's business pitch to companies who may be privy to the idea of mass producing a natural ink product with a license, while returning money to SynthetINK through royalty payments. This would be the ideal outcome of the business but in any event we will be open to offers given to us and will thoroughly consider them.

A product like this has the potential to become very prominent in the ink industry. Likewise, the product would likely sell very quickly in its early stages. This would provide the company with a strong loyal consumer base that would be likely to remain intact for many years to come. The initial customers would be the business's that saw the potential in our company early on and will be the most loyal in our continued business relations.

Market Strategy

The prospect of a cheaper ink product that is produced using more environmentally friendly practices is one that will be very appealing to potential backers/buyers. Thus, the basis for marketing will rely on these concepts as well as being a pioneer of the strategies used to produce the pigments. Unique to the product is also the production of different colors that can be used in an array of products, thus adding versatility to SynthetINK's products.

The possible market strategies would implement the environmental upside of the product, and the cost-effectiveness of the product as focal points. The pigments will directly compete with current big name ink and colorant products in the industry. Initially the target consumers will be the ones who are concerned with the environment as they are more likely to buy our safe and clean ink over the competitions, this revenue will then allow us to expand the target consumer with more advertising as well as more business relationships.

To attract customers in the early stages of business, the efficacy of the products would be shown to potential consumers by using them in scenarios that replicate the everyday use of such products. Representatives of the company would also consult large corporations on their interest in a finished product.

Eventually, SynthetINK hopes to license the rights to mass-produce a finalized product to an established company in the ink and ink related products industry, as this would allow SynthetINK to have a proper financial backing, resulting in the means to complete a large up-scale in production, initiating mass-production.

The initial ability of SynthetINK to distribute the products they produce will be very low as the development and research stages progress. As market value increases, a potential company seeking a license or ownership would assume the responsibility of distribution to consumers as well as packaging and advertising.

To properly gauge the antecedent interest of consumers, SynthetINK will be performing several inquiries on companies who consume or produce inks for business, as well as many civilians who we would target with our initial marketing, given that they are potential consumers. The company hopes to address many demographics when inquiring the public.

This can allow us to address any concerns of potential consumers and allow us to then sell to them, or it may expose a weakness or flaw in our product before we fully take it into the market.

SynthetINK hopes to create a large base of loyal customers to secure popularity and constant sales by quickly producing large amounts of product and making it easily accessible by anybody who wishes to buy. A company that the product is licensed to would also find success if this ideal is acted upon. This way, SynthetINK can sway their regular consumers to remain loyal to SynthetINK's products even when other products similar to their own emerge into the market which with the difficulty of patenting will be an inevitability.

Should the cost of the pigments turn out to be greater than other products on the market, the company would need to take the direction of marketing priced premium products. Similar to companies such as technology giant Apple, we would market our product as having features that are greater than its competitors, mirroring Apple's marketing strategy of the iPhone.

SynthetINK's first opportunity to assess true product value will be when their members travel to Boston to compete in the iGEM (International Genetically Engineered Machines) international Jamboree, with hundreds of judges and thousands of competitors in attendance. This is where the first working prototype will be displayed for large amounts of people to use. The responses and judging scores received will be a very good indicator of public interest in the products. However, these responses will be slightly biased by the viewers' liking of this type of science and innovation.

Setup

In the facilities already available to us, we have the equipment and tools necessary to being small-scale production. To upscale, no new equipment would be needed, just larger and more abundant equipment is necessary. Initial cost is quite low

and has been facilitated by generous sponsorships by companies who generally exist to fund projects similar to SynthetINK. Therefore, our groundwork is easy to complete and generally already done with.

Risks

As of now, Synthetink is an unknown startup company which has the prospect of competing with very large companies that have already become household names in the ink industry. This may dissuade buyers who are unsure, or not trusting of the potential of a new startup ink company bringing a product to the table that is using a completely different method for synthesizing inks than their current company does.

There has always been a stigma around the concept of GMOs and the bacteria E.coli. GMOs have always received criticism, with people thinking that organisms with scientifically modified DNA are harmful to consumers. E.coli, albeit generally harmless, has also been looked at as harmful to the public. These factors may hinder marketing success and turn potential buyers away from our product, even though SynthetINK's products are harmless.

Changing people's consumption of ink may prove difficult, as many potential buyers may become apathetic, especially if the cost of the ink does not prove a great enough factor in swaying their minds.

As the market for these types of products becomes larger and easier to access, consumers may be more inclined to buy from other companies with the same end goal of cheap, environmentally responsible ink. Sales may decline when other products similar to SynthetINK's emerge.

SynthetINK's inks may not necessarily represent a large disparity between current ink prices and its own ink prices. The genes used could amount to a large cost, which would offset the large profit originally projected.

Sources

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