

Adieu, Residues

TAS_Taipei 2018-2019

Marketing Plan*

**Disclaimer: This Marketing Plan is written from the perspective of an established company introducing a new product.*

I. Executive Summary

Adieu, Residues (AR) is a biotechnology company in Taipei, Taiwan that strives to develop a product that improves the safety of produce consumption.

When people consume fresh produce, they are exposed to several contaminants, including dirt, bacteria, insects, wax, chemicals, pesticides, heavy metals, etc. While most of these contaminants are eliminated during the process of fruit washing or processing, pesticides and heavy metals can still remain on produce when it arrives at the consumers' plates. Seeing that pesticides and heavy metals are agricultural contaminants that are capable of causing severe consequences on our bodies, they require substantial attention from the public^{1,2}.

AR aims to develop two products specialized for its buyers, consumers, producers, and distributors. AR provides two fast and reasonably priced products for the detection of contaminants on produce: a spray that only targets the most prevalent types of heavy metal contaminants, and another type of spray that targets the most prevalent types of pesticide contaminants. The products contain contaminant binding proteins that are linked with color proteins so users can visualize contaminated regions on their produce.

The two products will be packaged in two different ways depending on the type of users: small-scale and large-scale. Consumers will be using the small-scale product, which will be packaged in a small spray bottle, while distributors and producers will be using the large-scale product, which will be packaged in a large container that can be connected to a Spraying Lorry—trucks that spray substances such as pesticides on fields—as a way to spray the solution over a large quantity of produce.

Consumers, producers, and distributors will initially spray the produce to identify contaminated areas. Following this process, users will rinse the produce until the stain is gone. After the stain is removed, users can proceed to the next step whether it is transporting produce to the market or simply consuming the produce.

The small-scale product will be priced at 39.95 USD in 600 mL spray bottles, while the large-scale product will be priced at 109.95 USD. These price values are derived from a detailed analysis of factors such as consumer desire and competitor analysis. AR will work with governmental agencies to aid them in facilitating efficient agricultural contaminant tests by using the product presented. AR plans on taking advantage of the growing social media platform to communicate and promote its product to a larger audience.

¹ Tchounwou, Paul B., et al. (2012). Heavy Metal Toxicity and the Environment. Retrieved from <https://link.springer.com/book/10.1007%2F978-3-7643-8340-4>, page 133-64.

² Good, Kate. (2015, March 11). Toxin Alert! Common Pesticides Used on Produce and How They Impact Humans and the Environment. Retrieved from <https://www.onegreenplanet.org/environment/pesticides-used-on-produce-and-how-they-impact-humans-and-the-environment/>.

II. Business Description

AR's team consists of professionals with years of scientific and industrial experience. In order to successfully develop and distribute the product, AR has cooperated with several advisors from Tse Xin organization, Chang Gung University, and numerous producers, distributors and consumers. These consultants have provided profound insight into their experience and knowledge in the particular field of interest related to AR's business. AR has also formed long-term partnerships with the government of Taiwan, several factories and supply chain vendors. These valuable partnerships assisted us in creating our prototype. AR will continue to refine its technology to expand and continue to develop new and better products with these collaborations.

III. Market Analysis

Current Market Trends/Situational Analysis

A. On Pesticides

More than one thousand kinds of pesticides are used globally, and each of them have different toxic effects on humans and the environment. For instance, chronic exposure from pesticides may cause some of many deadly and terminal diseases: cancer, Alzheimer's disease, Parkinson's disease, endocrine disorders, and developmental disorders³. In fact, about 200,000 - 300,000 people worldwide die every year from toxic exposure to pesticides⁴. Every year for the past two years, 10-15% of Taiwanese produce do not satisfy the maximum residue levels (MRL) annually, which is defined as "the highest level of a pesticide residue that is legally tolerated in or on food...when pesticides are applied correctly"⁵. Furthermore, just last month, Taipei Times, a local newspaper, reported that "21.6% of government-tested items had pesticide residue exceeding" the MRLs⁶. On the other hand, an overwhelming 98% of produce tested by the European Union (EU) and the US Food and Drug Administration (FDA) are below MRLs, which is significant since these three regions of the world—US, EU, Taiwan— have similar MRL regulations for similar produce. What is even more alarming is that Taiwan is ranked as the country with the highest pesticide usage per land area in the world⁷.

B. On Heavy Metals

Similarly, heavy metals pose tremendous and permanent hazards to humans. In 2016, lead caused about 540,000 deaths worldwide⁸. However, only 38% of the people we surveyed knew that their produce can potentially be contaminated with heavy metals, whereas 81% knew

³ World Health Organization. (n.d.). Pesticide Residues in Food. Retrieved from <https://www.who.int/en/news-room/fact-sheets/detail/pesticide-residues-in-food>.

⁴ United Nation. (2017, Jan 24). Report of the Special Rapporteur on the Right to Food. Retrieved from <https://undocs.org/en/A/HRC/34/48>.

⁵ Food Safety - European Commission. (2018, Oct 17). Maximum Residue Levels. Retrieved from https://ec.europa.eu/food/plant/pesticides/max_residue_levels_en.

⁶ Lee, I-chia. (2019, October 3). Taipei Times: Excessive pesticide on fruit, veggies in Taipei. Retrieved from <http://www.taipeitimes.com/News/front/archives/2019/10/03/2003723308>.

⁷ National Taiwan Normal University. (2018, June 30). NTNU Hosts Global Symposium Expect to Turn Environmental Crisis into a Change. Retrieved from <http://en.ntnu.edu.tw/news-show.php?id=12348>.

⁸ World Health Organization. (n.d.). Lead Poisoning and Health. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/lead-poisoning-and-health>.

that pesticides were on their fruits and vegetables. Such disparity in knowledge between the two emphasizes the need for consumers to be educated about heavy metals in addition to pesticides.

Hence, the health effects of these two contaminants inspired us to develop products, collectively called Adieu, Residues sprays, that increases food safety.

Competitor Analysis

This section is divided into four categories: small-scale pesticide and metal detection, large-scale pesticide detection and heavy metal detection. Small-scale detection products are used by consumers that want to rapidly check their produce for contaminants prior to washing and consuming their produce. Large-scale detection targets a broader range of customers, such as farmers, distributors, governments that do irregular checkups, and testing centers. Our competitor analysis does not contain all the products that are in each category. We've simply provided one product for each category as an example.

Small-scale detection of pesticides:

Edicitsep Pesticide Test Kit from the company Taiwan Advance Bio-Pharmaceutical Inc. (TABP) is a detection test kit that allows consumers to cut off a section of the produce they are testing and use testing solutions to determine whether or not their produce has pesticides. This product detects organophosphate and carbamate, which are two large groups of pesticides⁹.

Small-scale detection of heavy metals:

The company ChemSee has developed a Generic Heavy Metal Detector that tests for cadmium, copper, nickel, cobalt, Zinc, mercury, and lead. It is used by cutting up produce and soaking them in the sold solution along with water. A color change will result and the color of the solution allows consumers to see what type of heavy metal their produce is contaminated with.

Large-scale detection of pesticides:

Large-scale pesticide detection often uses Liquid Chromatography-Quadrupole-Time of Flight Mass Spectrometer (LC-QToF). Liquid Chromatography-Quadrupole-Time of Flight Mass Spectrometer (LC-QToF) is used to determine degrees of polar and thermolabile pesticides. Because it involves mass spectrometry as well, this technique produces accurate results of detection tests.

Large-scale detection of heavy metals:

Heavy metals are often detected by mass spectrometry instruments, such as an Inductively Coupled Plasma Mass Spectroscopy (ICP-MS) machine. This machine is used to detect concentrations of elements that can go down to parts per quadrillion.

⁹ Taiwan Advance Bio-Pharmaceutical Inc. (2019). Pesticide Test Kits. Retrieved from http://www.abc-residue.com/product_detail.php?cate_index=10&item=65&%20set_lang=en.

SWOT Analysis

Small-scale pesticide detection: Edicitsep (TABP)

<p>Strengths</p> <ul style="list-style-type: none"> • This detects two common pesticides: organophosphates and carbamates. • This produces precise results (down to 0.01 ppm and up to 10 ppm depending on the pesticide). • This expresses a visible reaction. 	<p>Weaknesses</p> <ul style="list-style-type: none"> • This only detects sections of the produce, so we cannot make sure whether the entire produce is clean. • This takes 20 minutes for the color change to be visible. • This is not easily accessed by rural producers/distributors.
<p>Opportunities</p> <ul style="list-style-type: none"> • This takes advantage of highest usage of pesticides per land area in Taiwan. • This only cuts a section of the produce. 	<p>Threats</p> <ul style="list-style-type: none"> • Our product can detect contaminants on the entire produce. • Our product shows a color instantaneously.

Small-scale heavy metal detection: ChemSee Generic Heavy Metal Detector

<p>Strengths</p> <ul style="list-style-type: none"> • This conducts rapid detection (~ 1 minute for color change to occur) • This is convenient to use - preparation for the test is easy. • This has different colors for different heavy metals. 	<p>Weaknesses</p> <ul style="list-style-type: none"> • This targets mostly producers/distributors (Not specifically designed to test for consumers). • The testing reagents included in testing kits may cause health effects such as eye irritation, skin irritation, and corrosion in stomach, skin etc. • This cannot be used for large-scale use.
<p>Opportunities</p> <ul style="list-style-type: none"> • This takes advantage of highest usage of pesticides per land area in Taiwan. 	<p>Threats</p> <ul style="list-style-type: none"> • The public may disapprove of dangerous chemicals involved in checking for contaminants.

Large-scale Pesticide Detection: ICP-MS

<p>Strengths</p> <ul style="list-style-type: none"> • This detects concentrations of elements that are in parts per billion and parts per trillion. • This detects several types of heavy metals and pesticides. 	<p>Weaknesses</p> <ul style="list-style-type: none"> • This requires 1-2 weeks for test reports to arrive. • This requires specific equipment/location to conduct the detection test • This requires specialist during detection testing.
<p>Opportunities</p> <ul style="list-style-type: none"> • This takes advantage of highest usage of pesticides per land area in Taiwan. 	<p>Threats</p> <ul style="list-style-type: none"> • Our product produces instantaneous results. • Our product produces visible stains-easy for identification.

Large-scale Heavy Metal Detection: LC-QToF

<p>Strengths</p> <ul style="list-style-type: none"> • This produces precise results with a wide spectrum of pesticide detection. 	<p>Weakness</p> <ul style="list-style-type: none"> • This cannot be operated by a person that has not been trained to use this machine.
<p>Opportunities</p> <ul style="list-style-type: none"> • This takes advantage of higher usage of pesticide per land are in Taiwan 	<p>Threat</p> <ul style="list-style-type: none"> • Our product is easier to operate without specialized individuals. • Our product has an instantaneous effect.

Adieu, Residues Heavy Metal, Pesticides Spray for Distributors and Farmers

<p>Strengths</p> <ul style="list-style-type: none"> • This easily visualizes color on areas of produce with contaminants. • This gives instantaneous results. • This has a convenient usage (spray), so we don't need to use several solutions before results are shown. 	<p>Weaknesses</p> <ul style="list-style-type: none"> • This requires extra step in distribution process. • This may have purified protein residue after testing. • This tests for most important residues only. • This Reduced bacterial efficiency. • This doesn't detect all.
<p>Opportunities</p> <ul style="list-style-type: none"> • This takes advantage of highest usage of pesticides per land area in Taiwan. 	<p>Threats</p> <ul style="list-style-type: none"> • The public can be scared about consuming proteins.

<ul style="list-style-type: none"> ● In recent years, consumers have become more aware of what they consume (based on our survey). 	
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Adieu, Residues Heavy Metal, Pesticides Spray for Consumers

<p>Strengths</p> <ul style="list-style-type: none"> ● This easily visualizes color on areas of produce with contaminants. ● This gives instantaneous results. ● This has a Convenient usage (spray), don't need to use several solutions before results are shown. 	<p>Weaknesses</p> <ul style="list-style-type: none"> ● This requires an extra step in distribution process ● This may have bacterial residue after testing. ● This tests for most important residues only ● This requires extra step in consumption
<p>Opportunities</p> <ul style="list-style-type: none"> ● This takes advantage of highest usage of pesticides per land area in Taiwan 	<p>Threats</p> <ul style="list-style-type: none"> ● This has reduced bacterial efficiency ● This kit doesn't detect all contaminants (only some) ● The public can be scared about consuming proteins

IV. Marketing Program

Product

Heavy metal versus pesticide:

Our product is divided by the type of agricultural contaminants the sprays detect, heavy metals and pesticides. Below is a chart that clarifies the contents of the two sprays. These sprays can be used for all three sectors of customers: consumers, producers, and distributors.

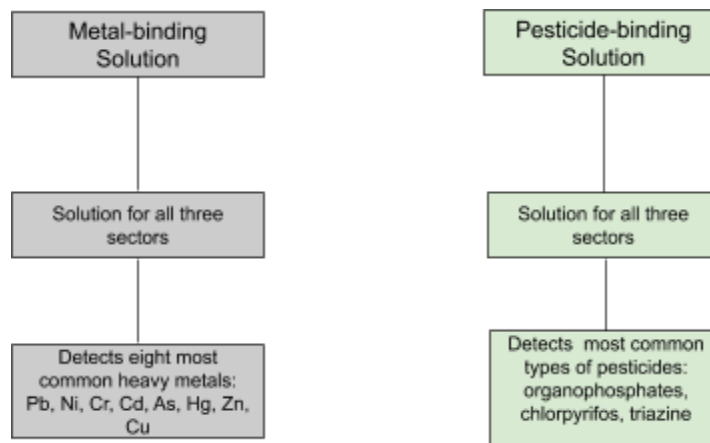


Figure 1: Flowchart of the Content Format of our Products

Specifically, heavy metal detection products would detect the eight most common heavy metals: lead, nickel, chromium, cadmium, arsenic, mercury, zinc, copper¹⁰. On the other hand, pesticide-detecting products test for the three of the most common classes of pesticides, which are organophosphates, triazines and chlorpyrifos¹¹.

Each of our two solutions are further divided into small-scale and large-scale use.

Small-scale versus large-scale:

A substantial amount of agricultural contaminants are not removed throughout the process of harvesting and transporting the produce to the markets. Thus, AR's product should be used since it produces fast detection results and ensures that any produce can pass detection tests before they arrive at the consumer's plate.

AR's small-scale, consumer products can be used in three easy steps. First, a consumer sprays the contaminated produce with AR's developed product. Only the regions of the produce where contaminants are present will a visual color be seen. Second, the consumer rinses the contaminated produce with water to remove the contamination. Lastly, the consumer sprays the produce again to verify if the contaminants are completely washed away and washes the produce once again to remove any remaining color stain. This process is repeated until there are no color stains on the produce.

A similar protocol applies for producers and distributors. Since they are testing produce in large quantities, they can apply a technique that resembles that of Tomatotek, which is a tomato sorting machine that separates unripe, green tomatoes from ripe, red tomatoes based on the color of the fruit¹². AR hopes to develop a similar machine that isolates produce coated with our color proteins from clean produce that do not have such color stains. The incorporation of this technique along with AR's product will be extremely convenient for producers and distributors to use, since it decreases the amount of time and labor needed for conducting agricultural contaminant detection tests.

Packaging

We are packaging our spray in the small-scale and large-scale sprays based on volume. For small-scale use, pesticide-binding solutions and metal-binding solutions are each packaged in a 600 mL household spray container. We determined this volume based on the average volume of three common spraying products: Dettol Kitchen Cleaner, Lysol Kitchen Cleaner and Mr. Muscle Bathroom Cleaner (Figure 2). As this product is

¹⁰ Intechopen. (2018). Environmental Contamination by Heavy Metals. Retrieved from <https://www.intechopen.com/books/heavy-metals/environmental-contamination-by-heavy-metals>.

¹¹ Environmental Protection Agency. (n.p). Organophosphate Insecticides. Retrieved from https://www.epa.gov/sites/production/files/documents/rmpp_6thed_ch5_organophosphates.pdf

¹² Woodside Electronics Corporation. (n.d.). Revolutionary Technology. Retrieved from <https://wecotek.com/technology/>

developed especially for consumers, it is important that the product is accessible and convenient to use. Thus, AR decided to bottle the liquid into a spray container, which is portable and does not take up much space.



Figure 2: Left: Spray Bottle of 750 mL Dettol¹³. Middle: Spray Bottle of 650 mL Lysol Kitchen Cleaner¹⁴. Right: Spray Bottle of 500 mL Mr. Muscle Bathroom Care¹⁵.

For large-scale use, pesticide-binding solutions and metal-binding solutions are each packaged in larger volumes, since distributors and producers have to spray significant amounts of produce on the field. AR decided to package the solutions in large tanks attached onto spraying lorries. Through this method of packaging, producers and distributors are able to use a spraying lorry to spray produce with large quantities of AR’s product liquid and test for color stains. To determine the volume that this product should be packaged at, we referred to a bottle of malathion pesticide purchased from a Taiwanese company, 台灣赫斯特媒體股份有限公司. We averaged the recommended amount of pesticide usage per acre for different kinds of produce and discovered that an average of 1.875 L of pesticides are used per acre (Figure 3). Because AR’s product is targeted to detect pesticides, we decided that it was logical to determine the amount of product we should bottle in one container based off of the amount of pesticide used per acre. Thus, we decided AR’s large-scale detection solution should be bottled at a volume of 1.8 L.

Type of Produce	Recommended amount of use per acre (L)
Beans	1 ~ 1.2
Eggplants	2

¹³ Miss My Supermarket. (n.d.). Dettol Spray Power and Pure Kitchen 750mL. Retrieved from <https://www.missmysupermarket.com/dettol-spray-power-and-pure-kitchen-750ml.html>.

¹⁴ Amazon. (n.d.). Lysol Kitchen Pro Antibacterial Kitchen Cleaner Spray, 22oz, No Harsh Chemicals. Retrieved from <https://www.amazon.com/Lysol-Kitchen-Antibacterial-Cleaner-Chemicals/dp/B0000716CX>.

¹⁵ Office Stationary. (n.d.). Mr. Muscle Bathroom Cleaner Spray Bottle 500mL. Retrieved from <https://www.officestationery.co.uk/product/mr-muscle-bathroom-cleaner-spray-bottle-5-in-1-500ml-ref-1005055-314246/>.

Tomato	2
Strawberry	1.6 ~ 4
Citrus	1 ~ 1.2
Lychee	2.5
Papaya	1 ~ 2
Enokitake	2
Average	1.875

Figure 3: Table of Recommended Pesticide Usage per Acre Acquired from 台灣赫斯特媒體股份有限公司

The Environmental Protection Agency (EPA) requests that cleaning product containers should include a Hazardous Materials Identification System (HMIS) label in order to meet Occupational Safety and Health Administration’s Hazard Communication Standard (OSHA HCS). As requested from the EPA, the outer surface of the AR bottle will include an HMIS label that contains a “Product Identifier”, a “Warning or Danger signal word box”, a “Number that Identifies the Type of Health Hazard”, and any “Personal Protection Equipment (PPE)” that should be worn when using the product¹⁶.

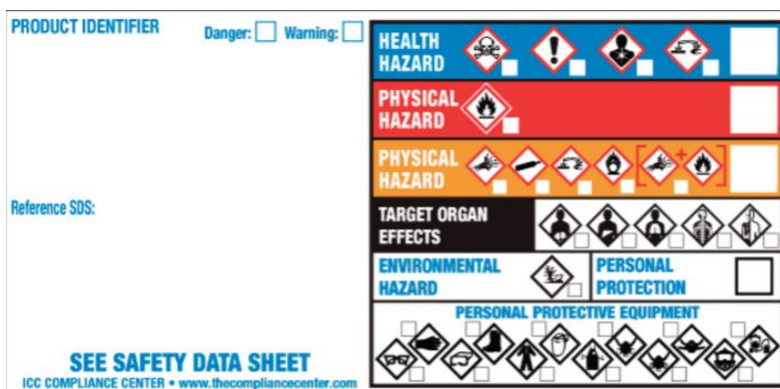


Figure 4: HMIS Label Requested by EPA¹⁷.

¹⁶ California Department of Pesticide Regulation. (n.d.). How to properly label a cleaning product container. Retrieved from https://www.epa.gov/sites/production/files/2013-08/documents/fact_sheet_how_to_properly_label_a_cleaning_product_container_1.pdf.

¹⁷ California Department of Pesticide Regulation. (n.d.).

Pricing

AR's product spray will be priced at 39.95 USD per bottle. Each bottle consists of 600 mL of the liquid content. This price was derived from a competitor product called Edicitsep from Taiwan Advanced Bio-Pharmaceutical Inc., who prices their product at 45 USD. Their product allows for 16 tests. In other words, one test of the product costs 2.74 USD. Through prototype testing of our product, we determined that on average, each fruit/vegetable uses up 20 mL of solution if they are coated thoroughly. Therefore, our product can be used 30 times. From that, we decided that our product has to be substantially cheaper than 82.20 USD (the price of TABP's product if their kit had 30 tests) so that consumers will be willing to purchase our product. Thus, we halved this price to set the price of our product at 39.95 USD. For the large-scale product, we settled on a price a little less than 3 times the price of the consumer's product, which means that our product would be 109.95 USD. We made the price less than 3 times the price of the consumers' product in order to encourage distributors and producers to buy the large-scale product instead of the small-scale product.

Distribution Strategy

Usually, the Council of Agriculture (COA), Executive Yuan and governmental agencies are the ones that conduct contaminant tests on producers' and distributors' produce. Since AR's product is intended to help facilitate detection tests in the market, AR will cooperate with the COA, and other governmental agencies to aid the government by increasing the efficiency of contaminants test in markets and fields.

To target consumers, AR will sell products in grocery stores, wholesale stores and other online platforms. They would be stocked along with other vegetable and fruit cleaners.

Promotional Strategy

AR will advertise its product through digital advertising as well as other media outlets. These ads will highlight the health risks associated with the consumption of heavy metals and pesticides, and promote the efficiency of our product in detecting those contaminants. AR will also help raise awareness of the dangers of pesticides and heavy metal contaminants on produce by distributing brochures at locations such as food fairs, universities, and markets. This can potentially increase our market size and inform the public about the dangers of agricultural contaminants.

V. Challenges & Solutions

Product Certification

Since AR's product contains genetically engineered bacteria strains, the product would have to be meticulously labelled for any biohazardous effects that could be caused

by the consumption of this substance. Also, since the product is categorized as a produce cleaner, it is subject to OSHA HCS. The HCS has established guidelines, which require 1. evidence of proper labeling of chemicals; 2. SDS/MSDS documentation and details about Employee Access; 3. list/inventory of chemicals used in workplaces; 4. information about employee Hazcom Training¹⁸.

¹⁸ MSDS Online. (n.d.). OSHA HCS. Retrieved from <https://www.msds-online.com/resources/regulatory-information/osha-hcs/#targetText=The%20OSHA%20Hazard%20Communication%20Standard,with%20chemicals%20in%20the%20workplace.>