TED ANKARA COLLEGE FOUNDATION PRIVATE HIGH SCHOOL

Determination of the proper dosage of Acetylsalicylic Acid to increase the lifetime of Petunia bajeensis

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Biology Extended Essay

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Abstract

The aim of this extended essay is to determine whether a proper dosage of acetylsalicylic acid increases the lifetime of one of the most used horticultural plant (*Petunia bejeensis*) in normal house conditions.

Salicylic acid is a chemical compound which can be found on plants naturally and be used as a defence shield on microbial antigens. It also increases the intake of ions which are used to develop a strong immunity system. The easiest way to test the effects of acetylsalicylic acid is to use Aspirin tablets which are produced by Bayer.

The research question depended on that and it was "Whether the change in the concentration of salicylic acid (in the form of Aspirin®) in tap water as 0- 0.25 -0.75- 1.0- 1.25 mg affect the lifetime of *P. bajeensis* by watering them day by day, after watching them until the last plant dies."

To test hypothesis, *Petunia bajeensis* plants were watered firstly with different concentrations of acetylsalicylic acid (none- 0.25 - 0.5 – 0.75 – 1.0 – 1.25 mg), then watered day by day without acetylsalicylic acid using 75 ml water each. The experiment started on the date 21.05.2012 and lasted until the last *Petunia bajeensis* died. After the experiment finished, the living periods of *Petunia bajeensis* plants' which were watered with any quantity of acetylsalicylic acid compared with the living period of the control group which were only watered with tap water from beginning to the end. Collected data were analyzed by Anova, since there were only one efficient (quantity of acetylsalicylic acid). According to the Anova, p value was found as 1,00499076565487E-28. This means that the hypothesis is correct and acceptable. In other words, there is a proper dosage of acetylsalicylic acid which increases the lifetime of *P. bajeensis.*

At the end, it is found that a proper dosage of acetylsalicylic acid increases the living period of *Petunia bajeensis*. The *Petunia bajeensis'* which had only 0.25 mg acetylsalicylic acid were the only ones which lived longer than the control group. In other words, 0.25 mg of acetylsalicylic acid in –half an Aspirin- in 75 ml of tap water increases the living period of agricultural plants which can be used before going on long holidays. Salicylic Acid can be also used for increasing endemic plants' resistance since they are so fragile.

(word count: 382)

Table of Contents

I. Background Information:

Plants are essential in many ways in our lives. Colourful and blossoming plants not only attract bees but humans too. Their colours lights up the environment, where person is living, just like crayons colours up a bund book. Despite having many types of gardening, the most used one in Turkey is “container gardening”. It is the easiest way to growing horticultural plants but most of the housewives know that gardening is also an art. It is the easiest way to decorate a house. It also makes house a home. It is also known that the brighter and more active a house’s plants are, the housewife has more prestige than others. The most used plants on container gardening in Turkey are; violets, petunias, benjamins, fuschia, etc. This is the reason why I chose *Petunia bajeensis* for my experiment.

Aspirin (see Appendix 1)is a medical pill which has been released from Bayer since 1897, firstly isolated by Felix Hoffmann. It is also known as *acetylsalicylic acid* (ASA for short) and gets its name from the main component: salicylic acid. It is mostly used for reducing pain, aches and fever and also as anti inflammatory medication. The salicylic acid inside of the medication is also a big part of living organisms’ metabolism. [1]

Picture 1: *Petunia bajeensis*

In many essays on salicylic acid (see Appendix 2), it is proved that dose (dependently) plays an essential role in the growth and development process of plants.[2] Salicylic acid is a plant hormone which works in organic synthesis, growth, development, transpiration, ion intake and photosynthesis. It is known that salicylic acid is been synthesized as secondary metabolite in a plant. Just like naturally disabled people, some plants can develop a less working secondary metabolite system. Luckily; it’s been known by the researches of Mitchell and Broadhead which has been released in 1967, that the need of salicylic acid can be obtained from Aspirin thanks to its ability of easily hydrolization into salicylic acid.[3]

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[1] http://en.wikipedia.org/wiki/Aspirin
[2] http://www.biology-online.org/articles/researchers_plant_immune_systems.html
[3] “Effects of Acetylsalicylic acid on germination, growth and chlorophyll amounts of cucumber (*cucumis savitus* L) seeds” by Songül Çanakçı and Ömer Munzuroğlu (http://scialert.net/fulltext/?doi=pjbs.2007.2930.2934)

"Salicylic acid is synthesized by plants in response to challenge by a diverse range of phytopathogens ... "[4] which means salicylic acid is a chemical compound which can be found on plants naturally and be used as a defence shield on microbial antigens. A phytopathogen is a microorganism which threatens plants' health. Salicylic acid is also used on increasing the potential of ion intake which are also used in immunity system as helping B and T cells develop faster. In an immunity system, T-cells are the cells who engulf and destroys the antigens and the B-cells are the cells who produce the antibodies to fight with the antigens. They are both types of white blood cells or in other words lymphocytes.[5]

The reason why I have petunias was the fact that they can be found in every house. They are easy to purchase. Also, I chose *Petunia bajeensis* has because their perfect shade of pink color, big leaves that often used to attract more bees for an easier pollination and they are the most common petunias. They can be purchased from every florist. They are also not expensive.So it is a great chance that the housewives who nurture petunias are decorating their homes with beautiful *Petunia bajeensis.*

Despite that I cleared every point on my mind about my experiment; I was still in a great lack of a research question and a hypothesis. But the question remains the same; aspirin really makes the lifetime of a "house plant" longer? Due to lack of literature, this question has no answers yet. However it has been proved many times in daily life by regular people, not by scientists and none of them are reported (or easily reproachable). Many experiments done within the aspirin with agricultural plants and reported too. There is no chance that any experiments had been done on house plants. And there was no chance that I couldn't find an answer to these questions and couldn't make an explanation to my grandmother's daily experiences about the living period of her house plants to rely on but I was so sure about I cannot do it without a hypothesis whether it is correct or not.

Consequently, this paper will focus on the research question: "Is the lifetime of *P. bajeensis* affected by feeding those plants with different concentrations of acetylsalicylic acid?" and will discuss how the experiment was done, planned and performed as well as the results obtained by their eventuality, validity and to attempt to analyse their possible consequences.

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*Picture 1 was taken from Wikipedia the Free Encyclopedia:
http://en.wikipedia.org/wiki/File:Pink_petunias.jpg

[4]" Salicylic Acid in Plant Difference- the players and protogonists" by Gary Loake and Murray Grant (http://courses.ttu.edu/bot3401-holaday/Salicylic%20acid%20in%20plant%20defence%20-%20the%20players%20and%20protagonists.pdf)

[5] a) Pearson Baccalaureate Higher Level Biology Book
b) http://biology.duke.edu/donglab/images/papers/spoel_2012.pdf

II. Hypothesis:

The longest part of the experiment was to find a proper research question, H_0 and H_1. Since the immunity of plants makes plants live longer and acetyl salicylic acid is used to make plants immunity stronger by improving the rate of intake of necessary ion take, etc ; I decided to build my hypothesis and the research question on these basis. Literature shows that salicylic acid is produced by plants too. However sometimes it is hard to produce ASA for them. At that point, some of the plants can need the reinforcement of ASA. With the light of this information, my research question will be:

"Whether the change in the concentration if salicylic acid (in the form of Aspirin®) in tap water as 0- 0.25 -0.75- 1.0- 1.25 mg affect the lifetime of *P. bajeensis* by watering them day by day which is done by observing plants until the last plant dies?"

Since the H_0 is the hypothesis which I have to deny after the results of Anova table and the P-value in it, it has to deny that *a proper dosage of aspirin would not make a change in living period of Petunia bajeensis.*

Still I have to formulize a H_1:

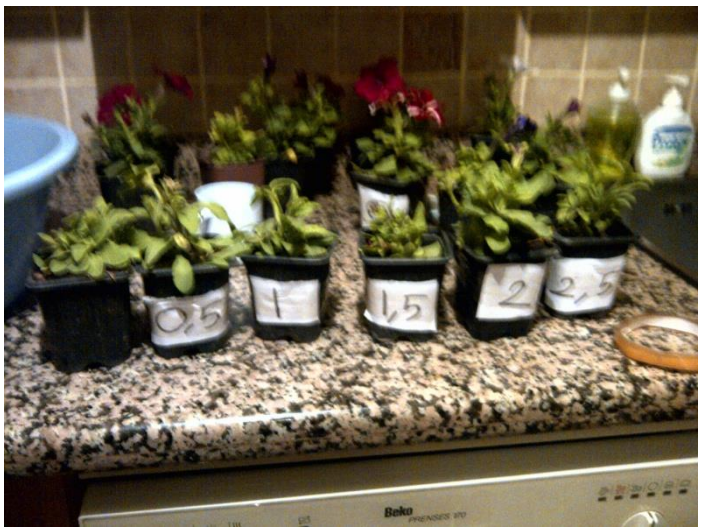
"The change in quantity of aspirin (acetylsalicylic acid) in its concentrations in water as 0- 0.25 - 0.5 – 0.75 – 1.0 – 1.25mg in the water of the P. bajeensis, which have the bright pink color and grand leaves and the biggest number of flowers –for only once but watered day by day with 75 ml of tap water affects the lifetime which is done by observing plants until the last plant dies starting at the date: 21.05.2012."

III. Method Development and Planning:

I knew that I was going to choose Biology as my extended essay subject. However, the procedure of finding a proper topic was one of the toughest parts. An exact year before the topic research, I read an article about the one and only endemic plant of Ankara named *Centaurea tchihatcheffii* which known Iridescent flower. After lots and lots of researches, I found out that I could have actually purchase a few from Atılım University. They have been producing them since November 2006. Almost in all of our meetings and teleconferences, they have kept delaying for delivery of plants. After 5 exact months, they told us that we have been missing the seed delivery time and they could not give any seedling. So I decided to change my subject and because of I was interested in plants, I made a little research on it. I chose *P. bajeensis* because they have a stable lifetime. I planned to find that lifetime with my control group. After a month which I was being devastated, I remembered a memory. In last summer before we went to the holiday, my grandmother told me that the easiest way to make plants healthier can be obtained by a proper dosage of aspirin. To find that proper dosage, many garden flowers had to be destroyed. The main question is; Are effects of aspirin just a superstition or the reality itself?

I was selective with my flowers. For getting the accurate results at the end of the experiment, I had to select them as same as possible. When I was in the flower market, I selected my *P. bajeensis* according to their:

- Length (30 cm)
- Number of leaves (5)
- Colour of leaves (pink) and
- Number of stamens (4)
- Age



Picture 2: Getting *Petunia bajeensis* ready for the experiment.

After choosing the materials that was going to be used at the experiment, it was time to clear up method in my head. What to do, how to do and why to do? These were the questions that had to be considered while developing a method. It was going to be tough; nobody said it was easy however it should be done with a supervisor who actually knows. So I asked from my extended essay supervisor and my mom who is a science teacher to help me while I was developing my method.

First of all, I had to label plants according to the usage of aspirin. But as a measure, I decided to arrange labels according to the number of tablets used. So the labels should go as 0 /0.5 / 1.0 / 1.5 / 2.0 and 2.5 . Since there are 5 trials which need to be done, the number of trial has to be added on the top of the labels.

I had to place the *P. bajeensis* into a pelvic and place it on the side of the window on the balcony and do not forget to close the window and the door. The reason why this process occurs is the reason that my cat adores eating plants and he may interfere the whole experiment (or aspirined plants can harm him). Another reason is that if the plants be together, it would be easier to observe the *Petunia bajeensis* during the experiment.

After putting all of the *P. bajeensis* into the pelvic, the solutions which will be only used at the first hydration had to be prepared. Pulverization of the aspirin tablets need to be done. The reason why tablets are crumbled is because of the fact that the powder can actually solve better in liquids and the mix will me more homogenous. Use mortar to make pills smaller.

After the pulverization of tablets, they need to be weighted on the weighing machine to get better data. It should be 0.25-0.5-0.75-1.0-1.25 mg in trials respectively. Mix every powder with 75 ml of tap water. Make this process in beakers. The reason why I watered my *P. bajeensis* with 75 ml is that while I was designing my experiment, I called my grandmother. As a person who gardens for 50 years as hobby, who could have known better than her how much *Petunia bajeensis* will need?

Water plants with solutions. Add the solution which has 0.25 mg of acetylsalicylic acid to the *Petunia bajeensis* which has the label of 0.25. Put other solutions this way respectively. Hold one of the *Petunia bajeensis* as control group of the experiment.

Then comes the observation part. Water *Petunia bajeensis* twice a day. Do NOT include aspirin anymore. Then wait until each and every plant die. Note which one of the *Petunia bajeensis* died and note it down. However, it is necessary to keep the temperature of tap water stable. Measure it every time before you water the plants. It has to be 20°C.

Use this method for 5 trials. The reason why it should be 5 trials is to get better data. With the use of 5 trials, I planned to get more acute results. With this way, the error possibility will be decreased.

I mixed 1 mg of every soil -which are added different concentrations of acetylsalicylic acid – with 10 l of water each to see if pH differs. It did. pH differentiation was 1 unit lower on the 1.25 mg Aspirin concentration. It was like that because the soil I used had fertilizer, minerals and etc added before and this might have caused the buffer effect.

-Materials:

Choosing the materials that was going to be used was the hardest part because I needed to clear my experiment method in my head. Since I had a cat for two years and also the fact that he adores eating plants, I was obligated to protect my experiment from him. I had to choose my materials according to the limitations of method and a cat.

After working so hard on the method with my mom who is a science teacher, I have listed my materials like this:

- 6 × 30 cm and 3 flowered *Petunia bajeensis* per trial (25 *Petunia bajeensis* at sum)
- 7,5 Aspirin® by Bayer tablet per one trial (3 gr 750 mg acetylsalicylic acid)
- graduated cylinder (uncertainty: ±0.5)
- 1875 ml tap water (uncertainty: ±0.5) at degree of 20°C (at the first hydration)
- weighing machine (uncertainty: ±0.5)
- a pelvic to put every *Petunia bajeensis* in it
- a mortar for pulverizing aspirin tablets
- thermometer (uncertainty: ±0.5)
- 6 × 30 ml beakers (uncertainty: ±0.5)
- 2 × glass stirrer

Note: For tap water, see Appendix 3

For list of variables, see Appendix 4

IV. Method

1. Place flowers in pelvic.
2. Label plans as 0-0.5-1-1.5-2-2.5
3. Pulverize every aspirin tablet, use mortar for it.
4. Weight it with weighing machine as (0.25-0.5-0.75-1.0-1.25 mg). Put into 75 ml tap water each.
5. One beaker must contain only 75 ml of tap water (without aspirin)
6. Put solutions into beakers.
7. Then water plants 0-0.5-1-1.5-2-2.5 with the solutions which have none-0.25-0.5-0.75-1.0-1.25 mg acetylsalicylic acid respectively.
8. Water plants day by day only with 75 ml of tap water. Do NOT put aspirin anymore.
9. Wait until every plant dies. Note which plants died every day.
10. Do not forget to measure temperature of the tap water with thermometer.
11. Repeat it for 5 trials.

V. Raw Data Table

Quantity of ASA (mg)	trials	amount of tap water (±0,5)	pH (±0,1)	temperature °C (±0,5) of tap water	number of leaves	color of leaves	number of stamen
0	1	75,0 ml	7,00	20,00	5,00	pink	4
	2	75,0 ml	7,00	20,00	5,00	pink	4
	3	75,0 ml	7,00	20,00	5,00	pink	4
	4	75,0 ml	7,00	20,00	5,00	pink	4
	5	75,0 ml	7,00	20,00	5,00	pink	4
0,25	1	75,0 ml	6,50	20,00	5,00	pink	4
	2	75,0 ml	6,50	20,00	5,00	pink	4
	3	75,0 ml	6,50	20,00	5,00	pink	4
	4	75,0 ml	6,50	20,00	5,00	pink	4
	5	75,0 ml	6,50	20,00	5,00	pink	4
0,5	1	75,0 ml	6,00	20,00	5,00	pink	4
	2	75,0 ml	6,00	20,00	5,00	pink	4
	3	75,0 ml	6,00	20,00	5,00	pink	4
	4	75,0 ml	6,00	20,00	5,00	pink	4
	5	75,0 ml	6,00	20,00	5,00	pink	4
0,75	1	75,0 ml	5,50	20,00	5,00	pink	4
	2	75,0 ml	5,50	20,00	5,00	pink	4
	3	75,0 ml	5,50	20,00	5,00	pink	4
	4	75,0 ml	5,50	20,00	5,00	pink	4
	5	75,0 ml	5,50	20,00	5,00	pink	4
1	1	75,0 ml	5,00	20,00	5,00	pink	4
	2	75,0 ml	5,00	20,00	5,00	pink	4
	3	75,0 ml	5,00	20,00	5,00	pink	4
	4	75,0 ml	5,00	20,00	5,00	pink	4
	5	75,0 ml	5,00	20,00	5,00	pink	4
1,25	1	75,0 ml	4,50	20,00	5,00	pink	4
	2	75,0 ml	4,00	20,00	5,00	pink	4
	3	75,0 ml	4,50	20,00	5,00	pink	4
	4	75,0 ml	4,50	20,00	5,00	pink	4
	5	75,0 ml	4,50	20,00	5,00	pink	4

Table 1: Experimental conditions of the experiment "Does the change in quantity of aspirin (acetylsalicylic acid) in its concentrations in water as 0.25 - 0.5 – 0.75 – 1.0 – 1.25 mg in the water of the petunia bajeensis, which have the bright pink color and grand leaves and the biggest number of flowers –for only once but watered day by day with 75 ml of tap water affect the lifetime which is done by observing plants until the last plant dies starting at the date: 21.05.2012?"

VI. Data Collecting and Processing

	0 mg	0.25 mg	0.5 mg	0.75 mg	1.00 mg	1.25 mg
1st trial	65,00	73,00	40,00	38,00	15,00	6,00
2nd trial	66,00	76,00	43,00	37,00	18,00	5,00
3rd trial	63,00	74,00	42,00	35,00	17,00	7,00
4th trial	65,00	75,00	41,00	39,00	19,00	6,00
5th trial	67,00	74,00	43,00	38,00	21,00	9,00
mean:	65,20	74,40	41,80	37,40	18,00	6,60
mode:	65,00	74,00	43,00	38,00	#NONE	6,00
Median	65,00	74,00	42,00	38,00	18,00	6,00
Range	4,00	3,00	3,00	4,00	6,00	4,00
Variance	2,20	1,30	1,70	2,30	5,00	2,30
Sd	1,48	1,14	1,30	1,52	2,24	1,52
Se	0,66	0,51	0,58	0,68	1,00	0,68

Table 2: Statistical results of experiment of determining the proper dosage of acetylsalicylic acid which increases lifetime of *P. bajeensis* plant.

ÖZET

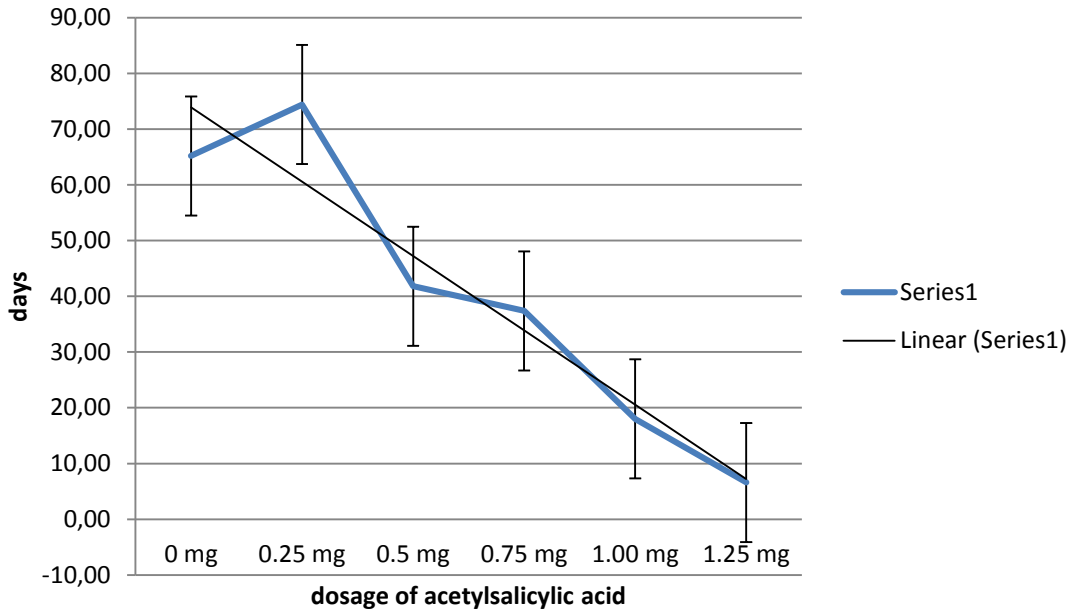
Gruplar	*Say*	*Toplam*	*Ortalama*	*Varyans*
0 mg	5	326	65,2	2,2
150 mg	5	372	74,4	1,3
300 mg	5	209	41,8	1,7
450 mg	5	187	37,4	2,3
600 mg	5	90	18	5
750 mg	5	33	6,6	2,3

ANOVA

Varyans Kaynağı	*SS*	*Df*	*MS*	*F*	*P-değeri*	*F ölçütü*
Gruplar Arasında	17130,17	5	3426,033	1388,932	1,00E-28	2,620654
Gruplar İçinde	59,2	24	2,466667			
Toplam	17189,37	29				

Table 3: Single factor Analysis of Variance (ANOVA) statistical calculation for all groups of plants.

Graph 1: Group shows the average lifetime of *the petunia bajeensis* which were fed with different concentrations (0-0.25-0.5-0.75-1.0-1.25 mg) of acetylsalicylic acid



VII. Evaluation:

The aim of the experiment was is to see whether acetylsalicylic acid improves *P. bajeensis* plants' immunity system. I did this experiment to prove a housewife superstition which I learnt from my grandmother. That was the first check point of the experiment. Since acetylsalicylic acid plays an essential role on building plants' development, the acetylsalicylic acid had to improve immunity system and increase the living period. However, it was pretty obvious that there is a limit which reduces or even kills the plants after a while. So the other aim was going to be finding the ideal quantity of acetylsalicylic acid which it perfectly works.

	0 mg	0.25 mg	0.5 mg	0.75 mg	1.00 mg	1.25 mg
1st trial	65,00	73,00	40,00	38,00	15,00	6,00
2nd trial	66,00	76,00	43,00	37,00	18,00	5,00
3rd trial	63,00	74,00	42,00	35,00	17,00	7,00
4th trial	65,00	75,00	41,00	39,00	19,00	6,00
5th trial	67,00	74,00	43,00	38,00	21,00	9,00
mean:	65,20	74,40	41,80	37,40	18,00	6,60

Table 4: Results of the experiment

-Hypothesis Discussion: Since my p value is 1,00499076565487E-28 which is smaller than 0.5, I have to reject my H_0 and accept my H_1 which is:

"The change in quantity of aspirin (acetylsalicylic acid) in its concentrations in water as 0- 0.25 - 0.5 – 0.75 – 1.0 – 1.25mg in the water of the Petunia bajeensis, which have the bright pink color and grand leaves and the biggest number of flowers –for only once but watered day by day with 75 ml of tap water affects the lifetime which is done by observing plants until the last plant dies starting at the date: 21.05.2012."

Also having a p value means that there is a difference between the results. In other words, different concentrations of acetylsalicylic acid changed the lifetime of *P. bajeensis*.

The observing process was rough. Since I had to use time better than anyone else because of delays of Iridescent Flowers from Atılım University, I had to do all five trials at the same time. The lack of information of mine about how long the experiment will last, it was really hard to predict when the data table will be complete. By the month of August, there were only two flowers left and the whole process was depending on them. The experiment's due date was up to death day of last living *Petunia bajeensis.* The last *Petunia bajeensis, who lived 76 days, died at 04 August 2012. It* was the *Petunia bajeensis* with 0.75 mg of acetylsalicylic acid (half tablet) of second trial. However, it was not the plant which concretized the results of the experiment. It was the *Petunia bajeensis* of fifth trial's control plant. As it was said before, a proper dosage for aspirin to help out the immunity of the plants that will cause the effects which are predicted are reached by the death of this plant. That was

it. It was resulted in the experiment that a half tablet of acetylsalicylic acid is necessary for immunity development. It did not only increased the living period of the plant but also made it taller, stronger, and more upright and etc… In other words, it is been proved with this experiment that "*Salicylic acid dose-dependently plays important roles in the growth and development processes of plants."*[6]

-Data Analysis:

	0 mg	0.25 mg	0.5 mg	0.75 mg	1.00 mg	1.25 mg
mean:	65,20	74,40	41,80	37,40	18,00	6,60
Range	4,00	3,00	3,00	4,00	6,00	4,00
variance	2,20	1,30	1,70	2,30	5,00	2,30
Sd	1,48	1,14	1,30	1,52	2,24	1,52
Se	0,66	0,51	0,58	0,68	1,00	0,68

Table 4: Data Analysis

The variance of a set of data can be calculated by subtraction of the value from the mean and doubled and standard deviation is the root. They both imply how much the data deviated from the mean. If the value which was recorded is proximate to the mean, the standard deviation and the variance will be smaller. This means the data are accurate. In other words, the results of the plant which was watered with 0.25 mg of acetylsalicylic acid deviated the less. This means that they have the most accurate results. However, as it can be seen from the table upward, the standard deviation of the plants with 1.00 mg of acetylsalicylic acid is higher than any other value. Which means it could be designed and rearranged in the evaluation part once more.

Standard error must be small to be the less with error. In other words, the smaller the standard error is, the more accurate my results are. The value with the smallest standard error value is 0.25 mg *P. bajeensis* which means I made the fewer mistakes while making their experiment.

[6] Effects of Acetylsalicylic acid on germination, growth and chlorophyll amounts of cucumber (*cucumis savitus* L) seeds" by Songül Çanakçı and Ömer Munzuroğlu (http://scialert.net/fulltext/?doi=pjbs.2007.2930.2934)

-Limitations and evaluations: There were many limitations during the experiment. For example:

1- After some researches which are made on internet while writing the introduction, I came across the proper process to develop petunias.

- "petunias do best in full sun"
- "partial shade"
- "hotter temperature"
- "solid pH"[2] that can be a problem. Because I do not necessarily know how much water do petunias like and designed the method according to the daily life experiences of my grandmother. It could have been too wet, that could have been the reason why they hose off.

In order to change this problem, I would probably make more research on how much petunias should be watered.[7]

2- I could have grown my own *P. bajeensis* from seedlings to obtain my flowers more accurate. If I did grow my own plants, I would be sure about the plant' similarities and differences.

3-The second problem was delivered by time. Since Atılım University made me wait for Iridescent Flowers for six months, I could not start my experiment at the time that I wanted. The problem of time followed me every step of the experiment. I could have not wait for flowers that long. I could have just give up and find another type of flower.

4- I could have get a better place for *P. bajeensis* with less light. By this way, I could have made them live more because they will not drought.

5-I could have found more ways to make better homogenous mix by stirring it up or heating it a little bit. Because its residue on the solid which could have blocked the transmission of materials between outer world and roots.

6- I could have found distilled acetylsalicylic acid from a university or a hospital. This way, the chemicals which are formulized in Aspirin while it is developed would not affect the experiment.

7- I could have been make better research on optimum water quantity that plants need or I could have even calculate it by using the formula:

ETcrop = kc x Eto [8]

[7] http://gardening.about.com/od/plantprofiles/a/Petunias.htm

[8] whereas; *"**ETcrop** = the water requirement (mm/day, mm/month), **kc** = the "crop factor", **ETo** = the "reference crop evapotranspiration" (mm/day, mm/month)."* (Taken from: http://www.fao.org/docrep/u3160e/u3160e04.htm#2.1.4 calculation of crop water requirements)

8- I could have made my experiment on a greenhouse so that my experiment would have been more professional and I could have control my controlled variables (such as humidity, light, temperature, etc) better. But I couldn't find any.

9-Because the change on the quantity of Acetylsalicylic acid, there were 6 types of water, That's because the quantity of acetylsalicylic acid changes water's pH. I could have used base (like NaOH) to stable the pH degree of water. This way, I could stabilize any pH change that may affect the results.

Picture 3: Putting Petunia bajeensis into a pelvic.

VIII. Conclusion:

Since the invention of it by Felix Hoffman from Bayer in 1897, Aspirin or acetylsalicylic acid became a huge part of our lives. Despite its many effects like reducing pain, aches and fever; it has been reported that it is useful in many ways. The newest of them is that taking an aspirin daily can reduce the cancer. Can it be a superstition? Maybe but there is a bigger superstition which was delivered by housewives for ages and still had not proved. Does Aspirin increases the living period of petite gardening plants?

Picture 4: During the experiment

It is been known that Aspirin plays a huge role on plants' immunity system. It is not only a plant hormone which regulates organic synthesis, growth, development, transpiration, ion intake and photosynthesis but also a works as a building block in secondary metabolism, it blocks the phytopathogens' activities. A phytopathogen is a microorganism which threatens plants' health. Salicylic acid is also used on increasing the potential of ion intake which are also used in immunity system as helping B and T cells develop faster. And by Mitchell and Broadhead in 1967, it is been proved that aspirin can be easily broken down into salicylic acid. In other words, it is possible to complement the need of salicylic acid in a plant's stem by making a water solution with it.

And this was the starting point of the experiment.

Petunia bajeensis was the best choice to have an experiment on. The main reasons for that was the facts that they had huge leaves, are easy to develop and common and also had a definite life time to observe effect of salicylic acid on life time of the plant. . After developing a method, I started my experiment 21.05.2012 and the last plant died on 04.08.2012. Since my p value was smaller than 0.5, I was obligated to accept my H_1. That meant a proper dosage of acetylsalicylic acid do improve the immunity of plants. Another good thing that tested with this experiment was the "proper" dosage. By the end of the experiment, control groups and the *Petunia bajeensis* with the solution which include 0.25 mg acetylsalicylic acid left. After the death of last plant without aspirin, it was obvious that 0.25 mg of acetylsalicylic acid was perfect.

It could be counted as a great advantage in agricultural industry because it is easy to consume Aspirin and it is healthy for *homo-sapiens* at some point and it is still thought that it is prevention for cancer which is the disease of millennium. By usage of acetylsalicylic acid, the need of chemicals that used for increase the living period of any plants will become a history. It could be used to increase resistance of endemic plants too because they are endangered and fragile. This is very essential on conservation and production of endemic plants. Also low price of Aspirin makes it an economical way to produce plants which have increased immunity and lifetime.

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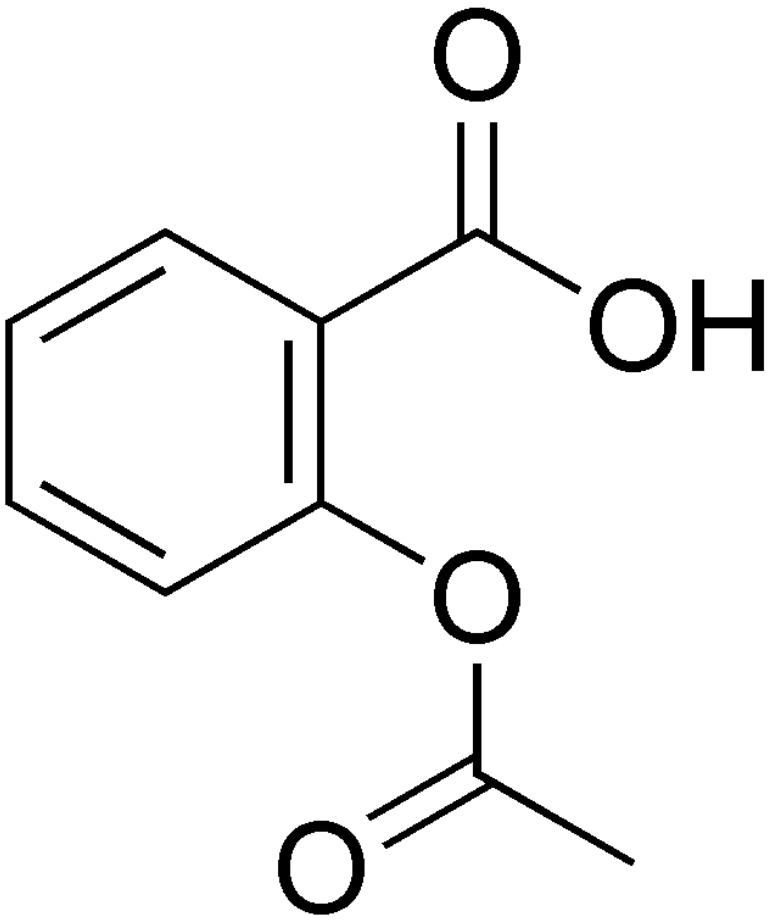
Appendix 1:

The compound of Aspirin:

1- Acetylsalicylic acid
2- Carnauba wax: A type of wax which is commonly used on dental floss, sweets and candies, instrument polishes, furniture wax and polishes, automobile waxes and shoe polishes, etc…
3- Corn starch: It is used in Aspirin as coat to making it swallow better.
4- Other binders:
   -Triacetin: The main triester between glycerol and acetic acid.
   -Cellulose
   -Hypermellose

Appendix 2:

Diagram of Acetylsalicylic Acid



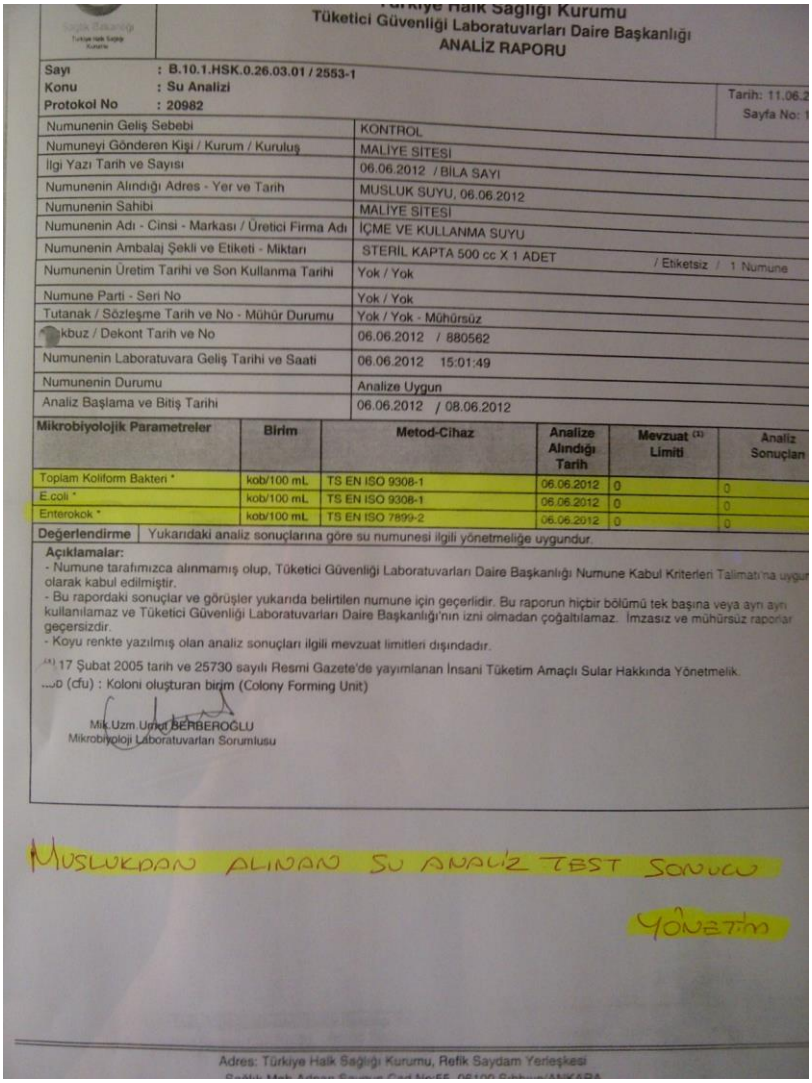
[9]

[9] The diagram is taken from Wikipedia- The Free Encyclopedia

Appendix 3:

The report of Turkish Health Government

The reason why the tap water has been used is the minerals inside of the water. Distilled water couldn't give any extra material to the plant for its proper development however tap water will. Although it is healthier, there shouldn't have been any extra living organism in water (at least not the bacterial types). They could be non-healthy for any organism who uses it despite plants. According to the Health Government's 06.07.2012 dated report, no sight of any bacteria seen on tap water



Türkiye Halk Sağlığı Kurumu
Tüketici Güvenliği Laboratuvarları Daire Başkanlığı
ANALİZ RAPORU

Sayı : B.10.1.HSK.0.26.03.01 / 2553-1
Konu : Su Analizi
Protokol No : 20982
Tarih: 11.06.2
Sayfa No: 1

Numunenin Geliş Sebebi	KONTROL
Numuneyi Gönderen Kişi / Kurum / Kuruluş	MALİYE SİTESİ
İlgi Yazı Tarih ve Sayısı	06.06.2012 / BİLA SAYI
Numunenin Alındığı Adres - Yer ve Tarih	MUSLUK SUYU, 06.06.2012
Numunenin Sahibi	MALİYE SİTESİ
Numunenin Adı - Cinsi - Markası / Üretici Firma Adı	İÇME VE KULLANMA SUYU
Numunenin Ambalaj Şekli ve Etiketi - Miktarı	STERİL KAPTA 500 cc X 1 ADET / Etiketsiz / 1 Numune
Numunenin Üretim Tarihi ve Son Kullanma Tarihi	Yok / Yok
Numune Parti - Seri No	Yok / Yok
Tutanak / Sözleşme Tarih ve No - Mühür Durumu	Yok / Yok - Mühürsüz
Makbuz / Dekont Tarih ve No	06.06.2012 / 880562
Numunenin Laboratuvara Geliş Tarihi ve Saati	06.06.2012 15:01:49
Numunenin Durumu	Analize Uygun
Analiz Başlama ve Bitiş Tarihi	06.06.2012 / 08.06.2012

Mikrobiyolojik Parametreler	Birim	Metod-Cihaz	Analize Alındığı Tarih	Mevzuat (1) Limiti	Analiz Sonuçları
Toplam Koliform Bakteri *	kob/100 mL	TS EN ISO 9308-1	06.06.2012	0	0
E.coli *	kob/100 mL	TS EN ISO 9308-1	06.06.2012	0	0
Enterokok *	kob/100 mL	TS EN ISO 7899-2	06.06.2012	0	0

Değerlendirme Yukarıdaki analiz sonuçlarına göre su numunesi ilgili yönetmeliğe uygundur.

Açıklamalar:
- Numune tarafımızca alınmamış olup, Tüketici Güvenliği Laboratuvarları Daire Başkanlığı Numune Kabul Kriterleri Talimatı'na uygun olarak kabul edilmiştir.
- Bu rapordaki sonuçlar ve görüşler yukarıda belirtilen numune için geçerlidir. Bu raporun hiçbir bölümü tek başına veya ayrı ayrı kullanılamaz ve Tüketici Güvenliği Laboratuvarları Daire Başkanlığı'nın izni olmadan çoğaltılamaz. İmzasız ve mühürsüz raporlar geçersizdir.
- Koyu renkte yazılmış olan analiz sonuçları ilgili mevzuat limitleri dışındadır.

(1) 17 Şubat 2005 tarih ve 25730 sayılı Resmi Gazete'de yayımlanan İnsani Tüketim Amaçlı Sular Hakkında Yönetmelik.
...ü (cfu) : Koloni oluşturan birim (Colony Forming Unit)

Mik.Uzm.Ümit BERBEROĞLU
Mikrobiyoloji Laboratuvarları Sorumlusu

MUSLUKDAN ALINAN SU ANALİZ TEST SONUCU

YÖNETİM

Adres: Türkiye Halk Sağlığı Kurumu, Refik Saydam Yerleşkesi

Appendix 4:

List of Variables

Controlled variables are the variables which should be same for each and every *Petunia bajeensis*. These variables for this experiment are:

.source of tap water

.temperature of tap water (20°C) which measured with thermometers (±0.5) and (adjusted to 20°C by adding warmer/colder water)

.quantity of Aspirin measured with a weighing machine (±0.5)

.graduated cylinders with uncertainty of ±o.5

.30 ml beakers

.type of soil

.type and quantity of *P. bajeensis*

-age

-large leaves

- pink

-5 leaves in flowers each

- 4 stamens

-length (by measuring with a ruler –uncertainty ±0.5)

Independent variable of this experiment is the quantities of the acetylsalicylic acid which is only added in the first hydration of the plants which will affect their immunity. Quantities of the acetylsalicylic acid are: 0.25- 0.5- 0.75- 1.0- 1.25 mg respectively. The acetylsalicylic acid is pulverized by mortar and weighted by weighing machine which has the error possibility of (±0.5)

Dependent variable is the variable which has to differentiate according to independent variables. In this case my dependent variable is the lifetime of *P.bajeensis* which is going to be observed by noting how many and which ones of *Petunia bajeensis* died each and every day.