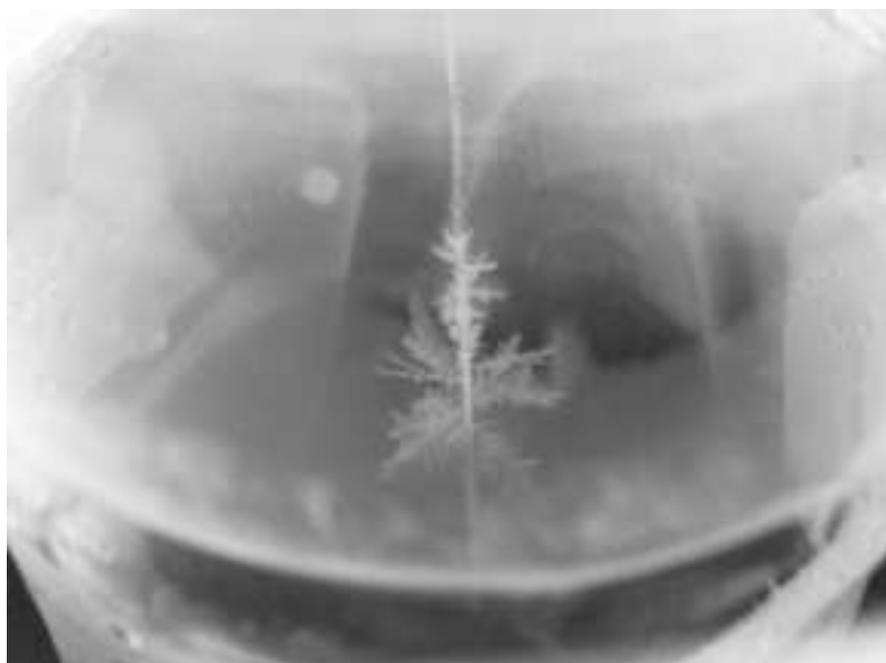


【2013】

Science Research II

— Collection of Research Abstracts —



Investigate the best way of making snow crystals

MEXT designated Super Science High School (2013 - Year Two)

Gifu Prefectural Ena High School

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Research of conditions which forms “Miura-Ori”

Taishi Kawai Yutaro Tsuchiya Saki Ito Kasumi Sasaki

<INTRODUCTION>

The subject of our research is the analysis of Miura-ori’s theory.

<OBJECTIVE>

The objective of our research is to take apart and analyze Miura-ori’s theory and apply it.

<METHODS>

First, we examined the relationship of the length and width of the square panel.

Then, we examined the universal application of result of the first experiment.

Third, we examined whether does Miura-ori’s theory still applies even if change on angle.

Forth, we examined how increasing the thickness of the paper influences Miura-ori’s theory.

<RESULTS>

The following results were obtained: from the first method, we found that Miura-ori’s theory only works if the number of square panels length-wise and width-wise are odd.

And from the second method, we found that the results from the first method are universal.

Then from the third method, we found that Miura-ori’s theory does not apply if the angle smaller than 90 degrees.

From the forth method, we found that it becomes difficult to fold the paper, when the thickness of the paper is increased.

< CONCLUSIONS >

From the results, it can be concluded that the objective was achieved. Miura-ori’s theory only works when the number of the panels of length and width is the combination of odd number and odd number. Moreover this finding is universal. Furthermore, when an angle is less than 90°, Miura-ori’s theory does not work, but on the other hand, if the angle is 90° or more, it works. It becomes difficult to fold up the paper, when the paper is thickness of paper small.

Investigate the best way of making snow crystals

Ikuma Nishio Maki Hanamoto Yohei Hida Kazuki Yoshimura

<INTRODUCTION>

The subject of our research is making a snow crystal.

<OBJECTIVE>

The objective of our research is to make an artificial snow crystal and research the necessary conditions for the formation of snow crystals.

<METHODS>

First, we tried to make it based on past experimental data.

Then, we investigated the difference about the formation of snow crystals by changing the material of the string we used.

Finally, from the results of experiment 2 we investigated the effect of the change of temperature and humidity on the formation process on snow crystals.

The variable is the material of the string we used.

<RESULTS>

The following results were obtained: about experiment 1, first, the fishing line became white then small spikes formed and in the end the spikes grew much larger. About experiment 2, using hair and fishing line had similar results as experiment 1. About experiment 3, even though the material of the strings hung in PET was different, similar data were provided.

<CONCLUSIONS>

From the results, it can be concluded that the objective was achieved. But, we didn't find the reasons why the changes happened and how the snow crystal formed. Therefore we try to find the result in the future.

Effect of tobacco on the growth of plants in soil

Shiho Miyagawa Kanae Kuwabara Mei Hasegawa

<INTRODUCTION>

The subject of our research is the effect of tobacco on the growth of plants in soil.

<OBJECTIVE>

The objective of our research is to examine whether it is possible to utilize a proper and efficient plant cultivating method using the growth promoting factors in tobacco by effectively testing them.

<METHODS>

In the first experiment, radishes were grown in dry cotton using tobacco extracts of different strengths. In the second experiment, radishes were grown in soil using tobacco extracts of different strengths; and whether or not growth promoting factors in tobacco affected radish growth was examined. In the final experiment, the second experiment was repeated using much less soil.

The experimental controls were the growing conditions. The variables were the strength of tobacco extract and the amount of soil in the final experiment.

<RESULTS>

The following results were obtained: it was confirmed that growth promoting factors in tobacco positively affected radish growth in dry cotton.

It was not confirmed that growth promoting factors in tobacco had any effect on radish growth in soil. The same result was verified even when the amount of soil was changed.

< CONCLUSIONS >

From the results, it can be concluded that the objective was not achieved. Moreover, three potential causes behind the recorded results were discovered. First, the soil may have contained bugs which decomposed tobacco's growth promoting factors. Second, the experiments may have not had positive results because of the use of weak tobacco extracts. Third, tobacco's growth promoting factors may have been shifted downward by gravity without coming into contact with the radish seed. Therefore, the effects of these potential causes will be confirmed in future experiments.

Matrices

Ryo Takayama Masahiro Takekoshi Kakeru Sugiura Naoya Suzuki

<INTRODUCTION>

The subject of our research is matrices.

<OBJECTIVE>

The objective of our research is to matrices, which we never studied in order to process a math problem which we learned already more easily.

<METHODS>

First, we learned basic knowledge and calculations of matrices.

Then, we process the rotational movement of a coordinate on a plane which we learned already more easily.

Finally, we solve the system of dual equations and 3-D equations by using Kraemer's formula, which uses matrices and determinant.

< SUMMARY >

We could find the way to process the rotational movement of coordinate on a plane which we have already learned and solution of simultaneous equations by using matrices. We thought we still have room for study because we felt the profoundness of linear algebra as we learned about matrices. We want to continue studying from now on because we learned the strict definition especially the rotational movement.

A study on the interaction of tastes

Honami Kumazaki Miki Kaneko Ami Taguchi

< EXPERIMENT① >

Objective:

To examine why we feel bitterness of tea after eating oranges by experimenting on the following three questions:

- (1) If we change the kinds of acid foods or tea, will it still taste bitter?
- (2) Is bitterness caused by mixing citric acid and tea or by drinking tea after drinking a citric acid aqueous solution?
- (3) If we drink bitter drinks other than tea, will it still taste bitter?

Methods:

- (1) We tested some combinations of sour drinks and food with bitter drinks.
- (2) We compared the taste of a mixture of a 1% citric acid solution and barley tea with the tastes of barley tea after drinking 1% citric acid aqueous solution.
- (3) We compared the taste of coffee after drinking the 1% citric acid solution. We also compared the taste of green juice to the taste of green juice after drinking the 1% citric acid solution.

Results:

- (1) Regardless of the type of sour food or drink, we had, it tasted bitter when we drank tea after having any sour food or drinks.
- (2) Bitterness is caused by drinking tea after drinking citric acid aqueous solution.
- (3) The bitterness of other bitter drinks, besides tea, is amplified by the acidity.

Conclusions:

We found that the reason why we feel that tea is more bitter after eating a citrus fruit is because citric acid amplifies the bitterness of tea.

< EXPERIMENT② >

Objective:

To examine whether other tastes are affected by acidity.

Methods:

Taste bonito broth, peach flavored water, and salt water after drinking a 1 %citric acid solution and see how sweet, umami, and salty tastes are affected by acidity.

Results:

Sweet taste of peach flavored water became stronger but neither umami taste of bonito broth nor salty taste of salty water was strengthened.

Conclusions:

We concluded that umami and salty taste are almost never amplified by acidity and that sweetness is strongly amplified by acidity.

< EXPERIMENT③ >

Objective:

To investigate how the perception of taste varies with temperature.

Methods:

Taste bonito broth, coffee, and melted sherbet at 0,20,40,and 60°C and examine the strength of each taste.

Results:

The higher the temperature of bonito broth, the stronger the taste of umami becomes.

The lower the temperature of coffee, the more bitter it tastes.

As the temperature increased from 0 to 40°C, the sweetness became stronger.

Conclusions:

We concluded that the higher the temperature of bonito broth, the stronger the taste of umami becomes.

For coffee, the lower the temperature, the more bitter it tastes.

For ice cream, the closer the temperature of ice cream is to body temperature, the sweeter it tastes.

Advantage of compound eye of insect , and its imitate

Shimon Nambu Takumi Hagiwara Itsuki Nakagami

<INTRODUCTION>

The subject of our research is to imitate the compound multifaceted eyes of insects. We thought it might make our lives better.

<OBJECTIVE>

The objective of our research is to make something which imitates the abilities of multifaceted eyes.

<METHODS>

First, we made a model of a compound eye with a transparent plate.

Then, we made two videos. One video had only one picture. The other video had multiple pictures. Then we tasted to see which video people noticed a difference.

Finally, we made a polarization parasol using a polarization plate.

The experimental control is that all people saw both videos and the variable is the order in which they watched the videos.

<RESULTS>

The following results were obtained: Firstly, couldn't make it well, but we were able to imitate the general form of a compound eye.

Secondly, there were 24 people who improved there record of stopping the video when they watched the video with multiple pictures. There were 6 people who improved their record when they watched the video with only one picture.

Thirdly, when we held the polarization parasol to a fluorescent light, we were able to see through the top and bottom of it.

< CONCLUSIONS >

From the results, it can be concluded that the objective was achieved. Moreover, the recorded results were due to watching the video with multiple train animations. Since we were able to watch multiples images, it be it easier for us to notice. Therefore, the behavior of compound eyes which makes insects sensitive to movement was established by the second experiment. This can be reproduced by incorporating a video surveillance camera. When we watch surround with the use of polarization parasol, the point of polarization changed. The bee takes cognizance of direction by use it.

Programming and mechanism of autonomous robot control

Taishi Mio Daiki Ogata Tatsuya Asano Hiromu Oishi

<INTRODUCTION>

The subject of our research is to develop autonomous robots and to learn programs which operate the robots.

<OBJECTIVE>

The objective of our research is to learn how to use tools and to understand the C programming language through our research.

<METHODS>

First, we referred to the website of Nippon Institute of Technology and ordered the robot parts. After that we downloaded the plans of robots.

Then, we produced the robots based on the plans by using computer programming.

Finally, after perfecting the robots, we operated the robots and repeated the improvements.

<RESULTS>

We have not completed assembling the robot yet, so we couldn't any experiment.

When it comes to programming, we succeeded in understanding of a sample program completely which we had downloaded from the Internet.

< CONCLUSIONS >

From the results, it can be concluded that the objective was not achieved.

Therefore, we should finish fabricating the robot at once and write an original program.

Research of structures which can absorb an external shock

Kasumi Sakamoto Sota Ido Miyuki Sakurai Tetsuro Nishio

<INTRODUCTION>

The subject of our research is to create structures which can absorb external shock.

<OBJECTIVE>

The objective of our research is to make a structure that can prevent an egg from breaking when an egg is placed inside of it and we drop it.

<METHODS>

First, we made structure A and structure B by folding paper. Structure A has three quadrangular pyramids. And there are many pillars of paper (which looks like dynamite) attached to the egg. Structure B was made of three rings attached in the form of a ball. Then, we made both structures using thick paper. Finally, we dropped it and changed the state of the egg and height from which we dropped it.

The experimental control is that we made the structure using thick paper and vinyl tape and the variable is whether the egg was fresh or boiled and whether we dropped it from the second floor (5.0m) or the third floor (8.6m).

<RESULTS>

The following results were obtained: structure A succeed using the fresh egg from the third floor. So, we removed the dynamite like structure and changed the quadrangular pyramid to a triangular pyramid. This improved structure A also succeed using the fresh egg from the third floor. Structure B succeed using the boiled egg from the second floor. We attached the weight to the low part of structure and kept the egg stable. Improved structure B also succeed using the fresh egg from the third floor.

< CONCLUSIONS >

From the results, it can be concluded that the objective was achieved.

Moreover the recorded results were due to using structures that partially collapse.

Therefore, we'll make the structure A smaller and add the ball to structure B.

Research of developing truss bridge using pasta

Yasuhiro Horikawa Juri Nakamura Midsuki Matuda Hiroki Maeda

<INTRODUCTION>

The subject of our research is to construct Truss Bridge using pasta.

<OBJECTIVE>

The objective of our research is to find the difference in strength of different arrangements of pasta and construct the strongest Truss Bridge structure possible using pasta.

<METHODS>

First, we pasted pasta together.

Then, we cut pasta to 10cm and 15cm lengths.

Finally, we measured the strength of pasta by hanging a weight from center of the pasta.

The experimental variable is the weight limit of the pasta.

<RESULTS>

The following results were obtained; first, comparing the same number of pasta, special structures are stronger than flat shaped special structures ones. Especially hexagon and pentagon and triangle using six pasta noodles were stronger than others. Second, all 10cm-long pasta noodles are stronger than 15cm-long pasta noodles. There are two different kinds of breaking points. Some are broken very soon others are broken not so soon Also, at the point where the pasta noodles broke, the strong force from the weight transformed the color of some of the cross sections to white and left them rough. Others were left smooth. So we were able to determine the direction of the force.

< CONCLUSIONS >

From the results, it can be concluded the objective was not achieved. Moreover results were due to special structures capability of deconcentrating the force of the weight. Therefore special structures are very strong especially the triangle shaped special structure was the strongest structure.

Development of a model rocket which can carry payloads

Seiga Kogiso Shun Ichikawa Yugo Goto

<INTRODUCTION>

The subject of our research is making a model rocket which can carry payloads.

<OBJECTIVE>

The objective of our research is to make a model rocket which can carry payloads and to launch it, and recover it.

<METHODS>

First, we made three rockets. Each rocket had a different design. We launched them and compared their flight patterns.

Then, we made a rocket body based on Rocket No.1. We named this new rocket; Rocket No.4.

Finally, we launched the rocket No.4 and estimated its performance.

<RESULTS>

The following results were obtained: By the swing test, rockets No.1 and No.3 had a positive result and were successful. Although rocket No.2 had a negative result once, we improved it after words, and it became positive and was successful. The parachutes of these rockets were successful in the first experiment. And we launched each rocket. Then we made rocket No.4 based on rocket No.1 which carried out the best stable flight. We carried out the swing test and the engine ignition experiment on the ground for rocket No.4, and each was successful. We haven't launched it yet.

< CONCLUSIONS >

From the results, it can be concluded that the objective was not achieved. The launch experiments of rockets No. 1 to No. 3 were successful. We made rocket No. 4 which can carry a camera based on the experimental results. The simulation and the engine ignition experiments on the ground finished without any problems. Rocket No. 4 can now be launched. However, we have not launched it yet. Our next target is to launch rocket No. 4 and recover it safely.

Ruby synthesis

Sota Ichinose Shogo Kato Masashi Kato Chinatsu Toriyama

<INTRODUCTION>

The subject of our research is ruby synthesis.

<OBJECTIVE>

The objective of our research is to investigate the ruby synthesis the effect of size, shape and color on.

<METHODS>

First, we measured a fixed amount of raw materials and put it in a platinum crucible and mixed them together. Then, we put a platinum wire which was coiled up cover it.

Finally, we put the platinum crucible in heating furnace and heated it in accordance with the programmed settings. The experimental control is the heating time and the variable is the amount of raw materials and the use of a platinum wire.

<RESULTS>

The following results were obtained: We compared experiments 1, 2 and 3 of raw materials capable of creating the biggest sized ruby. We compared experiments 3 and 4.

We found that if platinum wire is used the color of the ruby is bright red and the surface is flat.

<CONCLUSIONS>

From the results , it can be concluded that the objective was achieved. Moreover, the recorded results were due to the amount of raw materials addition of and the platinum wire. Therefore, changing the amount and addition a platinum wire is the most effective way to synthesize ruby.

Silver mirror reaction

Kanami Kasuya Maho Ukai Risako Katsu Ryoka Suzuki

<INTRODUCTION>

The subject of our research is the silver mirror reaction.

<OBJECTIVE>

The objective of our research is to complete the silver mirror reaction extract successfully with formalin.

<METHODS>

First, we made ammonia silver nitrate. Then, we added formalin to ammonia silver nitrate. The experimental control is the temperature and the variable is the amount of formalin.

<RESULTS>

We tried to research how to make the silver mirror reaction with a lot of formalin. It failed. So, we changed the amount of formalin.

Finally, we succeeded when we reduced the ratio of formalin to ammonia silver nitrate.

< CONCLUSIONS >

From the results, it can be concluded that the objective was achieved. Moreover, the recorded results were due to reduced the ratio of formalin. Therefore, formalin can certainly be successfully used just as easily as glucose.

Influence on the strength of the agar by adding sugar

Ayumi Takatsuna Takuto Hayashi Ryota Kachi Taichi Nishio

<INTRODUCTION>

The subject of our research is the strength of agar, the kinds of sugar added to agar, and the relationship between the amount of sugar and the strength of agar.

<OBJECTIVE>

The objective of our research is to study the strength of agar when sucrose, fructose, and milk sugar are added respectively.

<METHODS>

First, 20ml of pure water, 0.25g of powdered agar, 0.01, 0.02, 0.03 mol of each sugar were mixed. Then, after fully heating, then they were cooled under 20°C conditions for about 24 hours. Finally, agar is out on an electronic balance, and pressure is applied in a fixed area and the measure of the weight when agar is crushed equals the strength of the agar. The experimental control is the acrylic cube with a surface area of 2 that we placed on agar and the variable is amount of sugar added to the agar.

<RESULTS>

The following results were obtained: Addition of sugar would increase strength of we tested additive-free agar. Moreover this was true for three kinds of sugar and the strength was the highest when the molar concentration of sugar was 1.00 mol/l. Conversely when molar concentration was 1.50 mol/l, the strength was the lowest. When molar concentration was 1.00mol/l the intensity for every kind of sugar, strength became in order of highest to lowest was sucrose, fructose, and milk sugar.

< CONCLUSIONS >

From the results, it can be concluded that the objective was achieved. Moreover, the recorded results were caused by the difference in the molecular structure of the sugar that was added. Therefore, the agar with added sugar had larger strength than the additive-free agar. From now on we will pursue strength of agar that exists between 0.50~1.50 mol/l for every kind of agar.

Extracting sugar from materials that contain sugar

Kazu Miyaji Ryo Morioka Masahumi Kajiya Kenta Hayashi

<INTRODUCTION>

The subject of our research is “Extracting sugar from materials that contain sugar.”

<OBJECTIVE>

The objective of our research is to investigate a method of extracting cellulose from glucose by the use of cellulose.

<METHODS>

First Experiment

- ① It was 0.5% of 1.0% enzyme solution + ※1 2.0mL of each solution were mixed.
 - ② It was incubated at 45 degrees celsius.
 - ③ 0.1mL was extracted and boiled to stop the reaction then 0.3mL of DNS was added and the solution was boiled for five minutes.
 - ④ We cooled it using running water.
 - ⑤ We measured it in an absorptiometer.
- ※1 A solution (mashed up cabbage in solution).
B solution (grilled cabbage in solution).
C solution (boiled cabbage in solution).

Second Experiment

- ① ※2 0.5mL of enzyme solution + 2.0mL of 1% CMC solution were mixed.
 - ② It was incubated at 45% degrees celsius.
 - ③ 0.1mL was extracted and boiled to stop the reaction then 0.3mL of DNS was added and the solution was boiled for five minutes.
 - ④ We cooled it using running water.
 - ⑤ We measured it in an absorptiometer.
- ※2 0.1%(D solution) 1.0%(E solution) 5.0%(F solution) 10.0%(G solution)

<RESULTS>

First Experiment

The following results were obtained: we couldn't improve efficiency of decomposition in changing the state of the cabbage.

Second Experiment

When the concentration of enzyme solution is from 0.1% to 5.0%, the decomposition speed is faster as concentration. But, the decomposition speed increase slowed down as the concentration was raised up to 10%.

< CONCLUSIONS >

From the results, even if we change the state of the solution the efficiency of decomposition doesn't change. The decomposition is hindered when the concentration of solution is too high. The enzyme which works is a part of cellulose.

Study of ceramic glaze

Yumina Nagano Kurumi Hara

<INTRODUCTION>

The subject of our research is the Study of ceramic glaze.

<OBJECTIVE>

The object of our research is to make ceramic glaze which melts at 1100 degrees Celsius and examine color alterations by caused by changes in the amount of added iron oxide copper oxide.

< EXPERIMENTATION①>

Methods:

First, we made barbotine and heated by fire at 750 degrees Celsius. Then, we mixed fritted ceramic glaze with former ceramic glaze. Finally, we brushed the glaze onto the test pieces and heated it by fire at 1100 degrees Celsius. The experimental control is the temperature we heated the ceramic glaze and the variable is percentage of former ceramic glaze and fritted ceramic glaze we used.

Results:

The following results were obtained: The former ceramic glaze didn't melt. When the mass ratio of former ceramic glaze and fritted ceramic glaze were 4-to-1, the mixed ceramic glaze melted at 1100 degrees Celsius.

< EXPERIMENTATION②>

Methods:

First, we mixed iron oxide with ceramic glaze. Then, we brushed the glaze onto the test pieces and heated it fire at 1100 degrees Celsius. The experimental controls are the ceramic glaze and the temperature at which we heated the ceramic glaze and variable is the amount of iron oxide.

Results:

The following results were obtained: When adding 0.05g of iron oxide, the color was light yellow and when adding 1.0g of iron oxide, the color was dark brown. By adding more iron oxide, the color became darker.

< EXPERIMENTATION③>

Methods:

First, we mixed copper oxide with ceramic glaze. Then, we brushed the glaze onto the test pieces and heated it fire at 1100 degrees Celsius. The experimental controls are the ceramic glaze and the temperature at which we heated the ceramic glaze and the variable is the amount of copper oxide.

Results:

The following results were obtained: When adding 0.1g of copper oxide, the color was celadon and when adding 1.0g of copper oxide, the color was dark green. By adding more copper oxide, the color became darker.

< CONCLUSIONS >

From results, it can be concluded that the objective was achieved. Therefore, when the mass ratio of former ceramic glaze and fritted ceramic glaze are 4-to-1, the mixed ceramic glaze melted at 1100 degrees. And, by adding more iron oxide or copper oxide, the color became darker.

Increase or decrease of mold colon bacillus at the mouth of a used PET bottle

Nanami Oyama Ryota Ogino Honoka Nishio

<INTRODUCTION>

The subject of our research is about the increase or decrease of mold colon bacillus at the mouth of a used PET bottle.

<OBJECTIVE>

The objective of our research is to search whether mold and colon bacillus decrease and whether used PET bottles can be preserved if they are wiped off.

<METHODS>

First, we prepared four PET bottle drinks and drank them and then kept them at 24°C. Then, we sterilized our hands and experimental tools, and wiped off the mouths of the PET bottles with a cotton swab, and applied it to a culture medium.

Finally, we preserved the mediums in 37°C and the next day we wiped off the mouths of PET bottles and applied them to a new culture medium.

The experimental controls are that the plastic bottles and mediums were preserved in a place of the uniform temperature without sunlight.

<RESULTS>

The following results were obtained: finally, the germs decreased. So we found that wiping the germs off of the mouth of a used PET bottle can reduce the amount of germs of each medium.

But, there was a difference in the increase and decrease of germs, so we should have done a control experiment.

< CONCLUSIONS >

From the results, it can be concluded that the object was not achieved.

Moreover, the recorded results were caused by not doing a control experiment.

Therefore, we must get correct results by doing a control experiment.

Durability of lactobacilli's fermentation in different temperatures

Ayumi Ito Jun Sasaki

<INTRODUCTION>

The subject of our research is the durability of lactobacilli's fermentation in different temperatures.

<OBJECTIVE>

The objective of our research is to examine the difference in the function of lactobacilli according to temperature and the durability of this function

<METHODS>

First, we mixed Bulgarian yogurt with milk in a paper cup. After a day, we take out the finished yogurt.

Then, we examined its pH and sugar content by using pH paper and a Food tester and the volume of water evaporated.

Finally, we mixed milk with it in a paper cup. After a day, we took it out. The experimental controls are the amount of yogurt and the amount of milk and the variable is temperature.

<RESULTS>

Volume of water evaporated by temperature of 30,35,40 and 45 °C.

The results were that at 40°C the smallest amount of water evaporated, the pH and sugar content and at 30°C and 45°C the largest amount of water evaporated, the pH and sugar content.

Next, we compared them by 40°C and 45°C every other day.

The results at 40°C the pH and sugar content was similar to original yogurt. But at 45°C it was larger than it. That is, smaller value equals good function.

< CONCLUSIONS >

From the results, it can be concluded that the objective was achieved. Moreover, we discovered two points. The better the function is, the better the durability is. This means that the function is related to durability!

Propagative power of the tickseed

Taichi Suzuki Yudai Yano

<INTRODUCTION>

The subject of our research is propagative power of the tickseed.

<OBJECTIVE>

The objective of our research is to make sure of grown strength of power of the tickseed.

<METHODS>

1. First, we cut the stalk of the grown tickseed for every gnarl, and we put it from root side in the beaker into which water was put.

Then, we did the same operation with each gnarl and without gnarl.

The experimental controls are water and temperature and the variable are height of a node and existence of a leaf.

2. First, we cut the grown tickseed into the upper part, the central part, the lower part.

Then, we put them into the flowerpot containing the ground.

Finally, we checked whether the bud and the root would have sprouted.

The experimental controls are soil and temperature.

<RESULTS>

1. The following results were obtained: the bud had sprouted from the gnarl of some stalks. Existence of a root was not checked. From portions other than a gnarl, existence of a bud was not checked either.

2. The following results were obtained: the bud had sprouted from the gnarl some stalks. Root was only from gnarl of the lower part. Neither a bud nor a root was checked from the cutting plane.

< CONCLUSIONS >

From the results, it can be concluded that the objective was achieved. Moreover, the recorded results were due to strength of power of the tickseed. Therefore, the bud and root of tickseed sprout only from a gnarl. A bud and a root have differences in the ease of sprouting by the upper part, the central part, and the lower part.

Relationship between plants and stress

Masanari Ishiyama Kosuke Suzumura Seiya Umemoto Katsutoshi Hayashi

<INTRODUCTION>

The subject of our research is how the stress caused by giving a salt solution or trans for might soil into basic are affects the growth of plants.

<OBJECTIVE>

The objective of our research is to put the result of the research to developing agriculture.

<METHODS>

First, we planted three micro tomatoes into each planter which has the same amount of soil.

Then, we put pure water, 0.5% of salt solution and 5% of one into each planter.

Finally, we added one planter and poured lime water into it.

The experimental controls are temperature, sunshine, amount of water, and the amount and kind of soil and the variable is the kind of solution.

<RESULTS>

The following results were obtained: Micro tomato we poured 5% of salt solution into wither in forty six days. Micro tomato we poured 0.5% of salt solution into bore two fruits. Micro tomato we poured pure water into bore four fruits. After adding lime water and making the soil the basic one of pH 7.2, we poured pure water into the planter, but the micro tomato didn't begin to bud.

< CONCLUSIONS >

From the results, it can be concluded that the objective was not achieved. Moreover, the recorded results were caused by that micro tomatoes were affected strongly by rain.

Therefore, we are determined to put a transparent cover on them in order to keep them out of rain and set them in the sun.

How to increase plant growth by using components of tobacco

Mei Kobayashi Sakiko Hori Tomohiro Asai Hayato Shibata

<INTRODUCTION>

The subject of our research is “About how to increase plant growth by using components of tobacco.”

<OBJECTIVE>

The objective of our research is to clarify how to grow plants in harsh natural conditions, using tobacco ingredients.

<METHODS>

First, we grew radish sprouts using pure water, liquid tobacco and water containing fertilizer.

Then, wilt and dry them.

Finally, we observe whether they grow without dying after watered again.

The experimental control is that all plants were dried and the variable is the solution which we gave the radish sprouts.

<RESULTS>

The following results were obtained: Radish sprouts that were grown in water containing fertilizer and pure water withered, but those that were grown in the liquid containing tobacco grew. And the stems of radish sprouts which were grown in a solution of tobacco were thicker than others.

< CONCLUSIONS >

From the results, it can be concluded that the objective was achieved. Therefore, a solution of tobacco has the natural qualities which can re-grow dead plants. In addition to measure the height of radish sprouts and it is absolutely necessary to examine the density and effect of the liquid tobacco.

Effect caused by the soil and light on the germination of sunflowers

Yuna Fuji Ayana Morikawa Haruka Fujine

<INTRODUCTION>

The subject of research is the effect caused by the soil and light on the germination of sunflowers.

<OBJECTIVE>

The objective of our research is to how germination growth changed when we changed the quantity of the soil and the amount of light to grow sunflowers.

<METHODS>

In the First experiment, we compared the germination and growth in alkali soil with that in , acidic soil. In the second experiment, we compared the germination and elongation of sunflowers in a darkroom and in the sun and shade. The experiment control is the volume of water and the variable is pH and the quantity of light.

<RESULTS>

The following results were obtained; In the first experiment, sunflowers didn't come out of both alkali and acidic soil. But the seeds in alkali soil came out a little when we took them out of the soil. In the second experiment, the sunflowers in a dark room grew better than those in sun and shade, but it became dry faster.

< CONCLUSIONS >

From the results, it can be concluded that the objective was achieved. Moreover, the recorded results that the sunflowers grew better, caused by alkali soil. In addition, dark rooms are suitable for germination but are unsuitable for growth.

Gene of medaka living in the Ena area

Saya Ando Chikage Furui Kanami Morikawa Rumi Kimura

<INTRODUCTION>

The subject of our research is the gene of medaka living in the Ena area.

<OBJECTIVE>

The objective of our research is to examine DNA of medaka living in the Ena area and compare them with the DNA of medaka living in other areas in Japan.

<METHODS>

First, we went to Higashiyama Zoo to learn about medaka.

Second, we conducted a survey about medaka in Ena area to local elementary schools and junior high schools to research where medaka live.

Using the survey, we looked for medaka, and captured medaka living in Naegi.

Finally, we analyzed the DNA.

<RESULTS>

The following results were obtained: the DNA of medaka in Naegi were similar to the one's in Nagareyama in Chiba prefecture.

< CONCLUSIONS >

From the results, it can be concluded that medaka living in ena seem to have some varieties. But we haven't got exact data, therefore, our next target is to get more exact data. In addition, we would like to collect more sample of medaka.

Inflation Theory

Masaki Kitamura Shuto Ohshima Ayano Fukudaira Mana Shindo

<INTRODUCTION>

The subject of our research is “Inflation Theory”.

We researched it to find out how the universe was born and how it came to be in its present state.

<OBJECTIVE>

The objective of our research is to explain “Inflation Theory” in a way that is easy to understand.

<RESULTS>

The following results were obtained:

The universe started from “nothing”, and was in a state of physical fluctuation. The newborn universe was very small, and had a lot of potential energy. Then, it expanded by potential energy, decreasing temperatures caused a vacuum transition to occur, vacuum energy was converted to thermal energy, and became very high-temperature. After that, the universe kept expanding, the temperature kept decreasing and became the present universe.

< CONCLUSIONS >

As we mentioned in our results, the early universe can be understood by inflation theory while researching. We came across some questions.

First, where did the particle that started from “nothing” come from, and where did it move through the tunnel effect?

Second, why did the early universe have potential energy? We had such questions, but it is difficult for us to solve them with our current knowledge. So we want to increase our knowledge of the universe.