Research Questions:

1. What is the difference between organic and inorganic manure?

2. What are the benefits of each type of farming in crop production?

3. Are the returns of a better quality in the inorganic farming/organic farming?

Abstract:

The topic of fertilizers was first chosen because it seemed rather simple and less time-consuming.

The researcher first handed out questionnaires to nearby farmers to collect the data required.

The researcher then researched on fertilizers and noted the times at which he retrieved the information.

Afterwards, the questionnaires were collected back and analyzed after which the literature review was done. It was seen that a total of 200 responses were given to the inorganic-organic questions and 100 responses to the open-based questions.

The data was displayed on suitable charts and tables which were described in the analysis.

The researcher then discussed about things learnt in this project and placed them in the discussion.

The researcher then went and added some more information to the literature review, data analysis, and discussion.

The conclusion was done soon afterwards.

The bibliography was then completed using the times noted down.

Literature Review:

Fertilizers, in our modern day society, have become a truly vital component when producing small or large amounts of crop. They are used for their ability to increase the yield and improve crop growth.

According to F.Mtambanengwe & P.Kosina from *knowledgeband.irri.org*, “*A fertilizer is any material, organic or inorganic, natural or synthetic, that supplies plants with the necessary nutrients for plant growth and optimum yield. Organic fertilizers are natural materials of either plant or animal origin, including livestock manure, green manures, crop residues, household waste, compost, and woodland litter. Inorganic (or mineral) fertilizers are fertilizers mined from mineral deposits with little processing (e.g., lime, potash, or phosphate rock), or industrially manufactured through chemical processes (e.g., urea)*”. It can be therefore stated, that organic fertilizers are easier to obtain, due the fact that they are natural materials which we can easily see in each path our lives. Inorganic on the other hand, though it may be difficult to obtain, it is already in a state absorbable by plants and can therefore administer rapid growth.

Organic manure is a fertilizer to the soil that contains the product obtained after decomposing organic matter (animal or plant matter). Organic manure helps in adding nutrients and organic matter to the soil thus increasing soil fertility. According to *Wikipedia.org*, “*Manure generates heat as it decomposes, and it is possible for manure to ignite spontaneously if stored in a massive pile. Once such a large pile of manure is burning, it will foul the air over a very large area and require considerable effort to extinguish*”, therefore it is always important to be cautious to not let fresh manure accumulate to become excessively large. It is always best to decompose manure as soon as obtained without letting it accumulate. Even if it is not needed at the moment, it can be sold and thus earn profit for the farmer.

Also, “*The fertilizer industry, right now, and historically, is in the business of saving lives—it is in the business of saving the soil—of raising the level of human nutrition and health*” as said by *W.A. Minor, Assistant to the Secretary of the United States Department of Agriculture, during the First Annual Convention of the American Plant Food Council in June 1946*. This means that fertilizers are one of the top objects in demand in our current day. Hence, it is important to use them the best way to obtain a great yield. Obtaining a great yield not only is beneficial to the farmer, but to the country itself because more than 70% of the world population eat plant food every day.

Research Methodology:

The researcher obtained the data for the project by giving questionnaires to farmers in the researcher’s community. A questionnaire is a survey instrument consisting of questions which are given to certain/random individuals whose answers are treated as data. The researcher chose to use the questionnaire because a questionnaire provides average results which are generally accurate. The researcher did not use the experimental method because results from only one farmer would not be accurate because various factors may have affected the growth of that specific plant. It would also be very time consuming. On the other hand, average results from various farmers would only take a tenth of the time taken as compared to the experimental method. The researcher conducted this experiment in the community of Georgetown. The researcher shared out 25 questionnaires and expected 20 but received all 25 back. The researcher then organized and analyzed the data collected.

SAMPLE OF QUESTIONNAIRE USED TO COLLECT DATA

Please place a tick (🗹) in the box which best suits your answer.

1. What type of fertilizer do you use?

* Organic fertilizer
* Inorganic fertilizer

1. Which has a higher nutritional content?

* Organic fertilizer
* Inorganic fertilizer

1. Comment on its nutritional content.

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1. How often do you use fertilizers?

* Once every two weeks
* Once a month
* Once every two months
* Once every three months

1. Describe the role of fertilizers in farming.

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1. What types of plants do you mostly use fertilizers on?

* All
* Fruits/Vegetables only
* Herbs only
* Shrubs only
* Flowering plants only
* Leafy plants only

1. What is the benefit of each type of fertilizer?

* Organic: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Inorganic: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. From the list of potential disadvantages of inorganic fertilizers, choose one.

* Leeching (washing away of inorganic fertilizers when watering or irrigating)
* High cost
* Accumulation of toxic wastes

1. From the list of potential disadvantages of organic fertilizers, choose one.

* Take long periods of time to provide nutrients
* Low in supply
* Have a bad odor

1. Which is easier to obtain, inorganic/organic fertilizers?

* Organic fertilizers
* Inorganic fertilizers

1. Which is more prone to pests and diseases?

* Organic fertilizers
* Inorganic fertilizers

1. Which is more resistant to flooding?

* Organic fertilizers
* Inorganic fertilizers

1. In your opinion, which yields a greater produce?

* Organic fertilizers
* Inorganic fertilizers

1. Which is better to manage for the farmer?

* Organic fertilizers
* Inorganic fertilizers

1. What is the quality of produce when both fertilizers are compared?

* Organic fertilizers give a better quality of produce
* Inorganic fertilizers give a better quality of produce

Results:

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| --- | --- | --- |
| TABLE SHOWING INORGANIC-ORGANIC RESPONSES FROM QUESTIONNAIRE | | |
| Question | Response | No. of persons |
| 1. What type of fertilizer do you use? | Organic fertilizer | 18 |
| Inorganic fertilizer | 7 |
| 2. Which has a higher nutritional content? | Organic fertilizer | 3 |
| Inorganic fertilizer | 22 |
| 10. Which is easier to obtain, inorganic/organic fertilizers? | Organic fertilizers | 22 |
| Inorganic fertilizers | 3 |
| 11. Which is more prone to pests and diseases? | Organic fertilizers | 19 |
| Inorganic fertilizers | 6 |
| 12. Which is more resistant to flooding? | Organic fertilizers | 25 |
| Inorganic fertilizers | 0 |
| 13. In your opinion, which yields a greater produce? | Organic fertilizers | 9 |
| Inorganic fertilizers | 16 |
| 14. Which is better to manage for the farmer? | Organic fertilizers | 18 |
| Inorganic fertilizers | 7 |
| 15. What is the quality of produce when both fertilizers are compared? | Organic fertilizers give a better quality of produce | 19 |
| Inorganic fertilizers give a better quality of produce | 6 |

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| --- | --- | --- |
| TABLE SHOWING RESPONSES GIVEN TO OPEN-BASED QUESTIONS | | |
| Open Based Question | Sample Answer Similar to Actual | No. of Persons |
| 3. Comment on its nutritional content. | Organic fertilizers contain huge amounts of nitrogen and small amounts of the other nutrients | 3 |
| Inorganic fertilizers contain mainly of nitrogen, phosphorus and potassium | 18 |
| 5. Describe the role of fertilizers in farming. | They are absolutely necessary to the plant as they provide necessary nutrients | 23 |
| They are not absolutely necessary as the plant can get nutrients from the soil and water also | 2 |
| 7. What is the benefit of each type of fertilizers? | Organic:   * They last longer | 6 |
| * Cannot leech | 5 |
| * Less likely to burn roots of seedlings | 1 |
| * Enhance soil | 2 |
| * Are cheap | 11 |
| Inorganic:   * They are fast acting | 17 |
| * They have precise amounts of nutrients | 6 |
| * Easy to use | 2 |

Data Analysis:

From the questionnaires, it was examined that more farmers preferred organic fertilizers than inorganic ones. Specifically, 140 responses were given to organic fertilizers whereas only 60 responses were given to inorganic fertilizers. This was because most of farmers owned small-scale farms or kitchen gardens.

Questions 2, 7 and 13 were used to answer the three researcher questions. From the table listed in the previous pages, question 2 had 3 responses for organic and 22 responses for inorganic. This was because most of the farmers realized that inorganic fertilizers contained purely of nutrients and nothing else. Question 7 showed that the benefits of inorganic fertilizers were that they are easy-to-use, have the precise amounts of nutrients and are fast-acting. 68% of the responses showed that they were fast-acting because most farmers noticed the quick uptake of the fertilizer by the plant as compared to organic. Question 7 also showed the benefits of organic fertilizers which was that they are cheap, last longer, cannot leech, enhance soil and are less likely to burn the roots of young seedlings. 48% of the responses given were that they were cheap because organic fertilizers is something available in excess and is seen almost every day in the surroundings. Question 13, had 9 responses for organic and 16 responses for inorganic. This was because most of the farmers to whom the questionnaire was given, thought, from their experience, that inorganic fertilizers yield a greater produce and are less time consuming.

From analyzing the bar and line graphs, the conclusion can be drawn that there are more farmers/planters who prefer organic than inorganic. Rather than the bar graph, the vast difference is seen in the line graph, wherein the only plotted point in which inorganic was more preferred was in question 2, which is obviously due to the fact that inorganic fertilizers contains more nutrients than that of organic fertilizers.

Discussion:

A plant requires sufficient air, water, temperature, light and nutrients. Most of the requirements listed are already provided to the plant from our environment and surroundings. However, not all soils contain the nutrients required. Therefore it is important that fertilizers be used to sustain plant growth. Before providing fertilizers, one needs to choose a type, inorganic or organic.

Organic fertilizers are made (decomposed) from natural and raw materials (mostly waste). The advantages of using organic fertilizers is that they are natural, provide good nutrients, transform sandy and clay soils to grow the plant, regulate the pH (potential hydrogen) of the soil and are very cheap. However, they take a longer time to provide nutrients, generally are low in supply, and have a bad odor.

Inorganic fertilizers are artificial unlike organic fertilizers and need to be manufactured. Contrary to organic fertilizers, inorganic fertilizers work immediately since they are already in a form absorbable by plants. They have a great balance of the nutrients, are affordable and are convenient to use. However, leeching (leeching is washing away of inorganic fertilizers when watering or irrigating) is very prevalent in many farms. In addition, some are not affordable and accumulate toxic wastes.

It is therefore better to use both and choose depending on which is best suited for the farm at hand. It is generally known that organic fertilizers are best for small-scale farms whereas the latter is best for larger farms. Though this is not always true, it is right for most cases. Organic fertilizers are great to use on long-term crops while inorganic fertilizers are better on short-term crops.

After choosing the fertilizer, it is important that the fertilizer is given at the right time. This is very crucial when growing the plant. Too much fertilizer causes the soil to become too acidic and too less fertilizer does not promote necessary growth. Therefore it is always recommended to check the pH of the soil before attempting to provide fertilizers.

If somehow, the soil has to increase in pH, some finely ground agricultural lime will do the trick in providing acidity. Wood ash can also be implemented. If the pH has to decrease, however, urea or organic matter will help as they decompose.

Conclusion:

In conclusion, it was learnt that organic fertilizers consist of less nutrients than inorganic fertilizers. Inorganic fertilizers are easy-to-use, precise in nutrients, fast-acting whereas organic fertilizers are cheap, long lasting, cannot leech, enhance soil and are less likely to burn the roots of young seedlings. It was seen that inorganic fertilizers provide a greater yield than organic fertilizers because they are time-efficient and fast-acting.

Recommendations:

It can be recommended that:

* Crops should not be given too much of either inorganic or organic fertilizers.
* Fertilizers are well protected from pests and diseases.
* Fertilizers are well ventilated in areas where there are no combustibles or fire-causing implements.
* Fertilizers are carefully implemented into the soil.
* Water is kept clean.
* Good growing conditions are maintained so that the plant takes all of the nutrients in the fertilizer.

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