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Response of Sakurab (*Allium chinense* G. Don) Production Applied with Organic and Inorganic Fertilizer under Balo-i Lanao Del Norte Condition

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ABSTRACT

This field experiment research, conducted in Balo-i, Lanao del Norte, Philippines, from August 26, 2022 to December 10, 2022, attempted to assess the impact of different fertilizer interventions on sakurab (*Allium chinense* G. Don) yield. Having a Split Plot Randomized Complete Block Design (RCBD) set-up, the experiment had treatment factors such as organic fertilizers (Control, Vermicast, Chicken dung, Vermicast + Chicken dung) and inorganic fertilizers (Control, Complete Fertilizer 14-14-14, Ammonium phosphate 16-20-0, Urea 46-0-0). The objectives were to determine the growth and yield of sakurab with different organic and inorganic fertilizers and to assess the combined impact of such fertilizers on sakurab yield. The study indicated outstanding variations in plant height, which is a reflection of the synergistic benefit of the organic blend of vermicast and chicken dung. Inorganic fertilizers, in the form of Urea (46-0-0), had comparable effects to the use of no fertilizers. On leaf number, inorganic fertilizers significantly affected leaf number, whereas organic fertilizers were shown to guarantee balanced nutrition supply and soil fertility improvement. The study emphasized sakurab's plasticity to fertilization treatment, with emphasis on resistance to synthetic fertilizers. Organic fertilizers greatly outperformed inorganic fertilizers in vegetative yield, and the vermicast and chicken dung blend had the greatest value. In summary, the research provides useful information to improve sakurab yield by using targeted fertilization techniques, highlighting the use of organic fertilization advantages and judicious inorganic fertilizer choice. The research advises farmers to implement a two-way chicken manure and vermicast system, look for alternatives of other inorganic fertilizers with optimal nutrient content, and build tolerance to adjusting fertilization techniques. Promotion of local and organic practices and ongoing research into synergistic fertilizer blends and economics is essential to sustainable sakurab cultivation.

INTRODUCTION

Sakurab (*Allium chinense* G. Don), also called Chinese onion, is identified by various names across cultures; known as "jiaotou" in Chinese and "rakkyo" in Japanese. It belongs to the Allium family, consisting of a various members such as bulb onions, green onions, garlic, and other native varieties, with these spice crops being widely cultivated in Asia (Stephens, 2015; CABI, 2019).

As a root vegetable, Sakurab is an important crop in Meranao food culture, being a traditional seasoning food of the Meranao people. It is a key ingredient in the preparation of the famous Meranao condiment known as "palapa," where it is carefully mixed with salt, chili, and ginger. Beyond its role in palapa, sakurab can also eaten raw as a side dish, making it a convenient ingredient in Meranao cuisine. The term sakurab or "palapa" refers to an entire setup for Meranao food preparation, as highlighted by Santos in 2018.

Sakurab, though better suited for cool climates, can adapt to regions without extreme heat, cold, or excessive rainfall, and would hence be suitable for farming in cooler areas or even in the winter month. It is environmentally resilient, tolerating a wide range of soils with a pH range of 6 to 7. Preferably, loose, sandy soils with a rich organic content are optimal for cultivation.

Remarkably, sakurab plants exhibit highly tolerant to high temperatures, tolerating up to 30 °C. Interestingly, most cultivars shows that relatively higher temperatures contribute positively to bulb development (Tindall, 1983). This adaptability to various environmental conditions underscores the flexibility of sakurab cultivation across different climates and soil conditions.

It is known everywhere in Lanao del Sur and is locally grown in elevated and sloppy areas of the towns of Balindong, Piagapo, Madalum and Calanogas. According to the local farmers, sakurab is easily grown without the need of synthetic fertilizer. Indigineous and organic mixtures is sufficient like the application of organic mulches and organic manures; provided that the temperature is cool and the soil is loose (Masnar, 2021).

Increased crop production largely relies on the type of fertilizer used to supplement essential nutrients for plants. The application of chemical fertilizers and organic manure has both positive and negative effects on plant growth and the soil. Chemical fertilizers are relatively inexpensive, have high nutrient contents, and are rapidly taken up by plants. However, the over application of fertilizer can result in a negative effects such as leaching, pollution of water resources, destruction of microorganisms and friendly insects, crop susceptibility

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to disease attack, acidification or alkalization of the soil or reduction in soil fertility, thus causing irreparable damage to the overall system (Chen *et al.,* 2006).

Organic manure possesses a variety of limitations, such as low nutritional value, slow decomposition, and different nutrient composition based on its organic materials, compared to chemical fertilizers. However, organic manure has multiple benefits due to the balanced supply of nutrients, including micronutrients, increased soil nutrient availability due to increased soil microbial activity, the decomposition of harmful elements, soil structure improvements and root development, and increased soil water availability. In agricultural fields organic manure that is produced from animal byproducts has been utilized to overcome environmental contamination and plant productivity reductions that result from the constant utilization of chemical fertilizer. Recycling waste from the livestock industry prevents environmental contamination and reduces treatment costs. At the same time, it promotes soil improvements and agricultural productivity. However, the simultaneous use of chemical fertilizer and organic manure has revealed diverse results relative to the plant types and soil characteristics (Chand *et al.,* 2006).

According to Murmu *et al.* (2013). most studies in agricultural fields have reported that the mixed use of chemical fertilizer and organic fertilizer manure decreases the damage that can be induced by chemical fertilizer and improves crop productivity.

Objectives

Generally, the study was conducted to evaluate fertilizer interventions on the sakurab production. Specifically, this study aimed to:

1. determine the growth and yield of sakurab as influenced by different types of organic fertilizers;
2. determine the growth and yield of sakurab as influenced by different types of inorganic fertilizers; and
3. determine the combination effect of organic and inorganic fertilizer application on sakurab production.

MATERIALS AND METHODS

Site Description

The field experiment took place in Balo-i, Lanao del Norte, Philippines, with coordinates 8°06'03.00" N and 124°14'19.85" E, and an elevation ranging from 370 to 375 meters above sea level. The soil in the area has adtuyon clay loam characteristics, with a slightly rolling topography. The local temperature is between a minimum of 25 degrees Celsius and a maximum of 32 degrees Celsius.

Experimental Design

The experimental layout followed a 4 x 4 split-plot design within a Randomized Complete Block Design (RCBD). The experiment comprised three (3) replications and a total of sixteen (16) treatments, covering an area of 7.5 meters by 20.5 meters (153.75 m²). The spacing between blocks was set at one (1) meter, while the distance between plots was maintained at point five (0.5) meters. A buffer or border of one meter was established between the experimental plots, ensuring an organized and systematic arrangement for optimal data collection and analysis.

The following treatments were evaluated in this study:

Factor (A) Organic Fertilizer

O_0 – Control

O_1 – Vermicast

O_2 – Chicken dung

O_3 – Vermicast + Chicken dung

Factor (B) Inorganic Fertilizer

I_0 – Control

I_1 – Complete (14-14-14)

I_2 – Ammonium Phosphate (16-20-0)

I_3 – Urea (46-0-0)

Cultural Management Practices

Preparation of the Plots

Clearing operation was done such as weeding, collecting all debris on and before the field was plowed and harrowed two times using tractor and animal drawn implement. Each plot measuring 1x1 (1sq. m) was built

Figure 1: Bulblets of pruned sakurab planting materials

with a wooden box within the perimeter in order to avoid possible soil erosion and maintain raised bed. The beds were covered to prevent erosion during the heavy rains. Moreover, the mulching materials were applied to the respective plots one week prior to planting. Organic mulches, such as corn stalk were applied at 5cm thick.

Soil Sampling

Soil sampling were taken after clearing operation, four holes were dug within the 120 square meter area to obtain random soil samples, and the soil was neither too nor too dry. The soil sample was brought to Soil Laboratory, DA Regional Field Unit to get results.

Preparation of Planting Materials

In the experiment, the Urder local variety of sakurab sourced from Watu-Balindong, Lanao del Sur, was employed (Figure 1). To prepare the planting materials, both leaves and roots of the plants were pruned, ensuring a length of at least 15-20 cm. Each hill was planted individually, with only one bulb per hill, carefully separated from its cluster.

Mulching

Corn stalk was used as organic material in mulching (Figure 2), it was been spread properly in all plots after

Figure 2: Preparation of corn stalks as mulching material.

applying organic ferilizers.

Planting Method

Planting activities were conducted either early in the morning or late in the afternoon to optimize favorable environmental conditions. The planting density was set at one hundred plants per plot, maintaining a distance of 10 cm between rows and 10 cm between hills. Planting was executed at a depth of 5.5 cm using traditional tools such as the Buso (a heavy solid sharpened metal implement) and Ansag (a planting guide crafted from bamboo) (Figure 3).

Fertilizer Application

Organic vermicast and chicken dung were applied

Figure 3: Planting method using ansag (planting guide) and buso (pointed metal).

through incorporation at a rate of 3 kg per specific plot (Figure 4), following the prescribed treatment guidelines. Inorganic fertilizers, including Complete 14-14-14, ammonium phosphate (16-20-0), and urea (46-0-0), were also administered through broadcasting 7 days after planting (DAP) at a rate of 80 grams per plot.

Figure 4: Organic fertilizer application

Water Management

Water management employed hand watering using a water sprinkler. The first watering was done immediately after planting. Subsequent watering was done at three days intervals up to the end of the experiment, excluding rainy days.

Insect Pests, Disease and Weed Control

There were no insect pest attacks observed from planting to harvesting. Weeding was done manually once a week, or whenever the weeds started to grow to avoid nutrient and water competition.

Harvesting

Harvesting took place approximately 95 days after planting (DAP). Conducted in the early morning, the process involved gently uprooting the plants, loosening the surrounding soil, and carefully extracting the bulbs to avoid damage. Subsequently, all harvested sakurab were washed under running water and then dried in a designated area (Figure 5).

Figure 5: Washing the fresh harvested sakurab.

Data Gathered

Plant Height (cm). Plant height was assessed at the time of harvest. Measurements were taken from the soil base of the plant or its bulb base up to the tip of the longest leaf for every 10 samples randomly selected from the plots.

Number of Leaves. The number of leaves was taken by counting every ten (10) sample randomly selected in the inner portion per plot every week.

Crop Stand at Harvest (%/plot). This was recorded by getting the proportion of plants that survived per plot multiplied by one hundred (100) at harvest.

Vegetative Yield (tons/ha). This was done by weighing the total harvested plants per plot and converted into ton per hectare using the formula below:

$$Vegetative\ Weight\ \left(\frac{\text{ton}}{\text{ha}}\right) = \frac{\text{Yield}}{\text{Plot}} kg\ x\ \frac{10000\ \text{sqm}}{1000\ ton}$$

Vegetative Yield (g/hill). This was done by weighing the bunch of 10 samples per hill randomly selected at the inner portion of the experimental plots.

Number of Bulbs per hill. This was recorded at harvest by counting the bulbs of 10 sample hills randomly selected at the inner portion of the experimental plot.

Statistical Analysis

The Analysis of Variance (ANOVA) for split plot in RCBD was used to test the significant differences among 3 replications, while least significant differences (LSD) was employed to test significant differences among means. The Statistical Tool for Agricultural Research (STAR) program was used for ANOVA and comparisons of treatment means.

RESULTS AND DISCUSSION

Plant Height (cm)

The variation in plant height between organic and inorganic fertilizers separately was significantly different. But the interaction effect between organic and inorganic fertilizers on plant height was not found to be significant, as shown in Figures 6 and 7.

Figure 6. illustrates that the mixture of vermicast and chicken dung caused plant height to increase highly significantly, with mean height at 54.79 cm for all inorganic fertilizers. Compared to other treatments, they had similar but greater mean heights, vermicast at 51.69 cm and chicken dung at 50.78 cm, both being greater than the zero-fertilizer control with mean height at 46.72 cm.

This means that the utilization of a mixture of vermicast and chicken manure greatly enhances and accelerates the development of sakurab plants. Though the utilization of either vermicast or chicken manure alone can positively affect the development of plants, it does not produce the same result as a mixture of the two.

To support this observation, Tejada *et al.* (2010) pointed out that vermicompost is rich in several plant-available nutrients and also enhances soil structure by increasing porosity, aeration, and moisture holding capacity, and as a result promotes better plant growth.

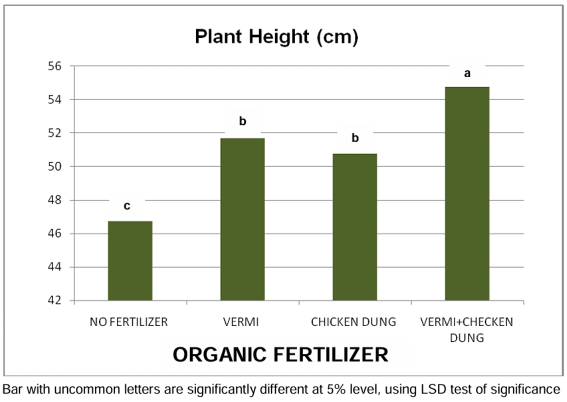


Figure 6: Plant height (cm) of the response of sakurab production applied with organic and inorganic fertilizer. Balo-i, Lanao del Norte. 2022.

Factors	P-value
Organic	0.0028
Inorganic	0.0081
Interaction	0.2296
CV(%) a	5.62
b	7.15

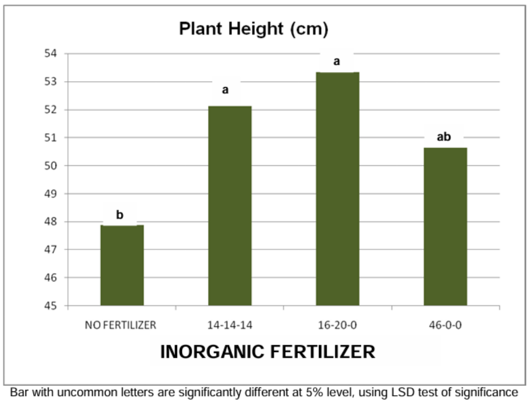


Figure 7: Plant height (cm) of the response of sakurab production applied with inorganic fertilizer.
Baloi, Lanao del Norte. 2022.

Factors	P-value
Organic	0.0028
Inorganic	0.0081
Interaction	0.2296
CV(%) a	5.62
b	7.15

Where inorganic fertilizer was applied (Figure 7), it was noted that the use of 16-20-0 produced a mean plant height of 53.33 cm, which was similar to plants that were treated with Complete fertilizer (14-14-14) with a mean value of 52.13 cm, and Urea (46-0-0) with a mean value of 50.63 cm. But applying Urea (46-0-0) produced the same impact as no fertilizer application with a mean value of 47.89 cm.

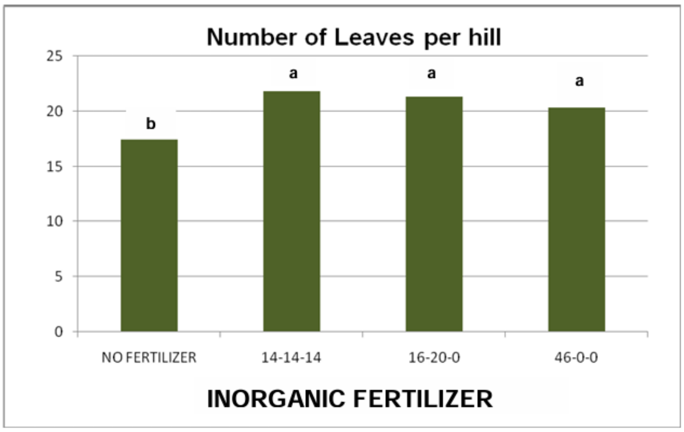
This concurs with the assertion by Rosen and Allan (2007), that yields garnered with organic fertilization are typically equivalent to those acquired from conventional fertilizers, although the advantages for the soil have already been proven. The difficulty in describing crop performance lies in many determinants such as assimilation, which is dependent on factors such as rainfall, temperature, and others.

Number of Leaves

The organic fertilizer application and the interaction between organic fertilizer and inorganic fertilizer were statistically not significant. Nonetheless, the application of inorganic fertilizer significantly and considerably affected the number of leaves per hill, as presented in Figure 8.

This finding is in line with the research conducted by Chand *et al.* (2006). Organic manure is recognized to have some limitations such as low nutrient value, slow biodegradation, and a different composition of nutrients based on its organic compounds compared to chemical fertilizers.

However, organic manure has a number of advantages, such as a well-balanced provision of nutrients, including micronutrients, increased availability of soil nutrients through enhanced microbial activity, breakdown of toxic constituents, better soil structure and root growth.



Bar with uncommon letters are significantly different at 5% level, using LSD test of significance

Figure 8: Number of leaves of the response of sakurab production applied with organic and inorganic fertilizer. Balo-i, Lanao del Norte. 2022.

Factors	P-value
Organic	0.4058
Inorganic	0.0171
Interaction	0.6016
CV(%) a	21.97
b	15.45

Figure 8, indicates that all three inorganic fertilizer sources had a very important effect on the leaf number compared to the control group that received no fertilizer. Specifically, Complete fertilizer (14-14-14) had a mean of 21.83, Ammonium phosphate (16-20-0) had a mean of 21.34, and Urea (46-0-0) had a mean of 20.36 for the same variable. Conversely, the lowest value was also achieved by the zero-fertilizer (No fertilizer) treatment at 17.44 cm. This was because of the absence of nutrient application as the soil did not have the necessary levels of nitrogen, phosphorus, and potassium that the plant required.

This is supported by the study of Lim *et al.* (2017), who performed the impact of various ratios of inorganic fertilizer and organic fertilizer on the yield and quality of amaranth. Their conclusion was that inorganic fertilizer is a rapid source of chemicals with high nutrients, but excessive use of inorganic fertilizer contributes to high nitrate levels in vegetables, thus affecting the quality of vegetables. Conversely, organic fertilizers were said to provide a more comprehensive and sustainable form of nutrients essential for crop growth and development.

Crop Stand at Harvest

Statistical analysis in Table 1. disclosed non-significant differences both between organic fertilizers, between inorganic fertilizers, and their interactions regarding crop stand. The results show that no significant effects were noticed when using both organic and inorganic fertilizers during sakurab cultivation.

This indicates that sakurab farming is able to survive with or without the use of defined organic and inorganic fertilizers. This is in accordance with the study by Masnar (2021), affirming that sakurab is hardy and can be successfully farmed without the need for synthetic fertilizers. Organic mulches and manures are found to be adequate, particularly under conditions of low temperatures and loose soils.

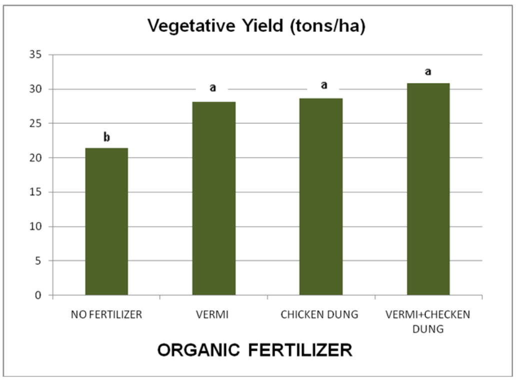
Vegetative Yield per Hectare

The difference in vegetative yield tons per hectare among organic fertilizers was determined to be highly significant, although the difference between inorganic fertilizers was also significant. However, the interaction between organic and inorganic fertilizers in vegetative yield per hectare did not demonstrate a significant effect, as illustrated in Figure 8.

The outcome is presented in Figure 9. Emphasizing the outstanding positive effect of using organic fertilizer on vegetative yield of sakurab. All three organic fertilizers, Vermicast, chicken dung, and the mixture of Vermicast and Chicken dung, produced higher than

Table 1: Crop stand (%/plot) of sakurab as affected by application of organic and inorganic fertilizer. Balo-i, Lanao del Norte. 2022.

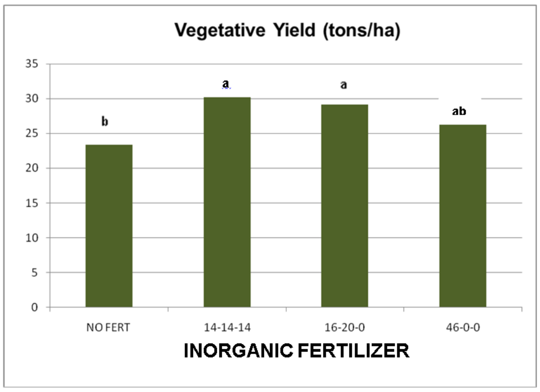
Organic Fertilizer	**Inorganic Fertilizer**			
	No Fertilizer	**14-14-14**	**16-20-0**	**46-0-0**
No Fertilizer	91.00	93.67	91.67	91.00
Vermicast	98.33	93.33	95.33	96.00
Chicken Dung	92.00	92.67	93.33	89.00
Vermicast + Chicken dung	94.67	96.00	96.33	92.33
Factors			**P-value**	
Organic			0.6064	
Inorganic			0.3025	
Interaction			0.6514	
CV(%) a			6.17	
b			4.87	



Bar with uncommon letters are significantly different at 5% level, using LSD test of significance

Figure 9: Vegetative Yield (tons/ha) of the response of sakurab production applied with organic and inorganic fertilizer. Balo-i, Lanao del Norte. 2022.

Factors	**P-value**
Organic	0.0030
Inorganic	0.0227
Interaction	0.3234
CV(%) a	13.00
b	20.10



Bar with uncommon letters are significantly different at 5% level, using LSD test of significance

Figure 10: Vegetative Yield (tons/ha) of the response of sakurab production applied with organic and inorganic fertilizer. Balo-i, Lanao del Norte. 2022.

Factors	**P-value**
Organic	0.0030
Inorganic	0.0227
Interaction	0.3234
CV(%) a	13.00
b	20.10

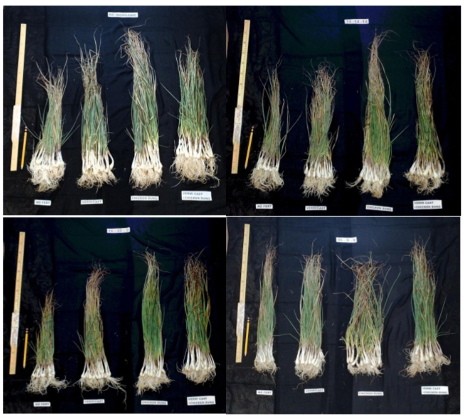


Figure 10. Harvested vegetative yield of sakurab 95 DAP.

Figure 11: Harvested vegetative yield of sakurab 95 DAP.

the control group, to which no organic fertilizer was supplied. Crops grown with Vermicast recorded a high yield increase compared to the control treatment (no fertilizer application), demonstrating that the addition of Vermicast is beneficial to sakurab production, with a yield of 28.13 tons/ha. The same was true for chicken dung application, where there was a high increase in vegetative yield, to 28.61 tons/ha, further proving the positive impact of organic fertilization on sakurab plants. The maximum yield was realized from treatment where a mixture of Vermicast and Chicken dung at the rate of 30.80 tons/ha. The minimum yield was recorded by the control where no organic fertilizer was applied with a yield of 21.41 tons/ha. This indicates how crucial organic fertilizers are in sacurab production maximization.

In addition, the findings strongly confirm that all the plants that were treated with varied organic fertilizers Vermicast, chicken manure, and the vermicast and chicken manure combination saw much better yields than plants that had no organic fertilizer application. The findings emphasize the significance of incorporating organic fertilization methods, especially using the combination of Vermicast and Chicken manure, as a way of enhancing sakurab yield in agricultural production.

In the inorganic fertilizer application point of view, it is evident that sakurab plants treated with varying amounts of inorganic fertilizers i.e., 14-14-14, 16-20-0, and 46-0-0 possessed similar vegetative growth yields (Figure 10). The highest yield was realized when using 14-14-14 fertilizer at 30.22 ton/ha, followed by 16-20-0 at 29.13 ton/ha, and 46-0-0 at 26.27 ton/ha. These outputs, although somewhat variable, can be said to be similar in that they lie within a reasonably narrow range. However, the 46-0-0 fertilizer-inoculated sakurab plants had the same yield as the uninoculated ones, each with 26.27 and 23.33 tons/ha, respectively. This indicates that the 46-0-0 treatment did not yield more than the control group. The similar yields of the various inorganic fertilizers explain the significance of not just observing the visibility of the nutrients but also their right proportion in order to get the maximum yield of sakurab. The results demonstrate the necessity of selecting and examining the inorganic fertilizers with extreme care in order to get the expected agricultural result.

Urea is a high-nitrogen nitrogenous fertilizer (46-0-0) that is supplied to plants. While as important as nitrogen is for vegetative development, plants need other material like phosphorus and potassium in order to mature and grow overall. Without these other nutrients present in the soil, the unbalanced composition of nutrients in urea only may potentially limit the plant's ability to achieve its full potential for growth, which will yield as much as plants with no inorganic fertilizer.

Additionally, the fact that the yield responses of urea-treated plants and non-fertilized plants are similar implies that using urea alone may not be giving a complete package of nutrients to fulfill the exact requirements of sakurab. It re-emphasizes the need to balance a fertilization scheme so as to ensure an availability of basic nutrients for maximum plant growth and production.

Factors	P-value
Organic	0.0401
Inorganic	0.0213
Interaction	0.0667
CV(%) a	25.00
b	15.96

Factors	P-value
Organic	0.0401
Inorganic	0.0213
Interaction	0.0667
CV(%) a	25.00
b	15.96

The results are indicated in Figure 11. Organic fertilizer treatment, particularly vermicast, chicken manure, and their blend yielded significantly higher vegetative output of sakurab plants than the control treatment with no organic treatment. Vermicast application resulted in a mean yield of 32.38 grams per hill, which was significantly higher than the control. Similarly, chicken manure application also recorded a significantly greater mean yield of 32.48 gram per hill than the control. In addition, the greatest mean yield was recorded for the mix of vermicast and chicken manure at 34.92 grams per hill. The results very evidently state the beneficial impact of organic fertilizer, especially the synergistic blend of vermicast and chicken manure, on enhancing the vegetative productivity of sakurab plants. In inorganic fertilizer treatment, the control group with zero inorganic fertilizer application had the lowest mean yield of 27.11 grams per hill.

The crops which were supplied with the full fertilizer (14-14-14) with an equal proportion of nitrogen, phosphorus and potassium exhibited the highest mean yield of 33.44 gram per hill. This study shows that a balanced proportion of the nutrients is needed to attain the highest vegetative yield of sakurab plants. Similarly, the application of the 16-20-0 which also contains a balanced nutrient level resulted in a mean yield of 32.37 gram per hill. This yield was significantly greater than that of the control group, once again showing the importance of a balanced nutrient input to produce sakurab. On the other hand, the 46-0-0, a nitrogen fertilizer only (urea), had a mean yield of 30.16 grams per hill. To the surprise of everyone, this yield was not different from the control group. This observation indicates that application of a single nutrient, even at a full strength, will not prove sufficient to cause the maximum vegetable yields on sakurab plants. The unbalanced nutrient configuration utilized urea (46-0-0) may have limited the plants from taking full benefit of the current nitrogen. This concurs with the claim of Lian *et al.*

(2017) suggesting that compound fertilizers, both organic and inorganic, can be superior to single nutrient fertilizers in promoting crop growth, yield, and soil health. The use of combined organic and inorganic fertilizers can provide a nutrient mixture for the maximum productivity and quality of crops. Crop growth and yield require an optimum supply of the necessary nutrients, like nitrogen, phosphorus, and potassium.

Number of Bulbs Per Hill

No significant differences were found among organic fertilizers, between inorganic fertilizers and their interaction regarding the number of bulbs per hill, as shown in Table 2. This is consistent with what was observed in the crop stand, implying that the use of both organic and inorganic fertilizers did not significantly influence the number of bulbs per hill for sakurab. This can mean that the planting of sakurab, either with or without organic and inorganic fertilizers, can either produce a different number of bulbs on the basis of the varieties planted.

It should be noted that sakurab bulbs grow either individually or in a group of 2-5 bulbs depending on the variety as well as the harvest age. Also, varieties and planting depth affect factors such as the length of the slender part of the bulb, as noted in the research conducted by Jorge *et al.* (2001).

Additionally, the non-significant treatments found in crop stand and number of bulbs per hill suggest that sakurab has a degree of adaptability to varied fertilization treatments. The plant variety and other cultural practices might be the possible causes of variations in bulb yields instead of the particular use of organic or inorganic fertilizers.

Summary

A field experimental study on the growth and yield of sakurab (*Allium chinense* G. Don) production was conducted using 4x4 factorial experiment organized in a Split Plot Randomized Complete Block Design (RCBD) and replicated three times. Factor A varied with different organic fertilizer types: Control (No Fertilizer), Vermicast, Chicken dung, and Vermicast + Chicken dung. Factor B included Control (No fertilizer), Complete Fertilizer (14-14-14), Ammonium phosphate (16-20-0), and Urea (46-0-0). The study aimed at establishing the growth and yield of sakurab affected by various forms of organic fertilizers, establishing the effect of varying forms of inorganic fertilizers affected by varying forms of inorganic fertilizers, and establishing the interactions of combined applications of organic and inorganic fertilizers on production of sakurab.

This research considered the influence of various organic and inorganic fertilizers on the growth parameters of sakurab plants. They determined sharp variations in the height of plants based on the type of fertilizer used. Surprisingly, the use of a mixture of organic and inorganic fertilizers did not influence plant height. Of the fertilizers used, using vermicast and chicken dung as a mixture resulted in the maximum height of the plants and indicated a very positive influence of the combination of these organic substances. Conversely, there were some inorganic fertilizers such as Urea (46-0-0) that performed similarly to applying no fertilizer at all. For the number of leaves per hill, inorganic fertilizer had a larger effect, whereas the composition of organic fertilizer did not significantly alter anything. Even though early research by Chand et.al (2006) revealed some disadvantages of organic manure, organic fertilizers were still appreciated for providing balanced nutrition and enhancing soil condition. Flexibility of sakurab plants to adapt in various methods of fertilization was evident because no significant variations were detected in the manner in which crops remained in the field. More experiments by Masnar

Table 2: Number of Bulb (bulbs/hill) of the response of sakurab production applied with organic and inorganic fertilizer. Balo-i, Lanao del Norte. 2022.

ORGANIC	Inorganic			
	No Fertilizer	**14-14-14**	**16-20-0**	**46-0-0**
No Fertilizer	**3.50**	**3.97**	**3.77**	**3.62**
Vermicast	**4.03**	**4.17**	**4.03**	**3.57**
Chicken Dung	**5.73**	**4.60**	**4.07**	**4.37**
Vermicast+Chickendung	**3.80**	**4.13**	**3.70**	**4.17**

Means in column with uncommon letter superscripts are significantly different at 5% level, using LSD test of significance.

Factors	**P-value**
Organic	0.0519
Inorganic	0.4555
Interaction	0.5718
CV(%) a	17.98
b	19.93

(2021) also proved that sakurab could be successfully cultivated even without using synthetic fertilizer. In terms of the overall fresh weight yielded per hectare, organic fertilizer mostly performed better than inorganic ones. The combination of vermicast and chicken dung gave the best yield. Although inorganic fertilizers at times equaled those yields, they emphasized the importance of having a well-balanced composition of vermicast and chicken dung. Although inorganic fertilizers occasionally equaled those yields, they underlined the importance of providing a properly balanced combination of nutrients for an optimal harvest. The study also emphasized the significance of carefully selecting and testing fertilizers to achieve results. Surprisingly, the number of bulbs per hill did not significantly vary using organic or inorganic fertilizers. This indicates sakurab is quite flexible with varying fertilizing methods. It also indicates that variations in bulb quantity most probably originate from the genetic composition of the plants or their planting, not the type of fertilizer.

CONCLUSION

In conclusion, the research stressed significant variance in height of plants between specific organic and inorganic fertilizers, of which the combination of vermicast and chicken dung had a large and better increase. This indicates the synergistic benefit of this organic combination, consistent with past studies highlighting the beneficial effect of vermicast on plant development. As far as the leaf number is concerned, inorganic fertilizers significantly noted the limitations of organic manure in achieving this. Nevertheless, the study points to the environmentally friendly nutrient supply by organic fertilizers, in line with previous research. Stand at harvest of plant indicated the tolerance of sakurab to the variation in fertilizers, as reported in studies of successful growth without fertilizers. The vegetative yield per hectares exhibited broad fluctuations, underlining the spirit of organic fertilization, while judicious selection of inorganic fertilizers is crucial in ensuring optimal sakurab production. No notable differences were exhibited by the number of bulbs per hill, underlining the adaptability of sakurab to fertilization practice. Shed light on how to maximize sakurab production by taking the benefits of organic manuring and judicious selection of inorganic fertilizers for proper nutrient balance.

Recommendations

The findings of this study provide valuable insights into optimizing sakurab production through strategic fertilization practices. To achieve enhanced growth and yield, the following are recommended:

1. Farmers are urged to embrace the use of a combined system utilizing vermicast and chicken manure. This energetic organic mix has shown a very significant effect on plant growth, overcoming the roles played by single organic manures. There should be focus on educating farmers about the advantages of vermicompost (vermicast) and chicken manure;
2. Alternative inorganic fertilizers that have a more balanced nutrient content, i.e., 16-20-0, 14-14-14, and 46-0-0, are suggested for sakurab cultivation. Recognition of the effectiveness of certain inorganic fertilizers must be conveyed to farmers;
3. Enhance the resilience of sakurab to the variability of fertilization practice, stressing that successful cultivation is possible without depending solely on synthetic fertilizers;
4. Encourage growers to examine indigenous and natural methods, including organic mulches and manures, as viable options; and
5. Recommend additional research to examine particular blends of organic and inorganic fertilizers that may have a more significant synergistic effect.

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