Internasional Journal of Integrative Sciences (IJIS)
Vol.4, No.3, 2025: 579-590

The Influence of FABA Growing Media and Chicken Manure Enriched with Blood and Cow Rumen Bioaktivator on the Growth and Yield of Shallot

Dwi Fitriani[1], Fiana Podesta[2*], Suryadi[3], Ririn Harini[4], Isnin Kurnia Safitri[5], Novi Aziz[6]
University Muhammadiyah Bengkulu
Corresponding Author: Fiana Podesta fianapodesta@umb.ac.id

A R T I C L E I N F O

Keywords: Bioactivator Chicken Manure, FABA, Shallot

Received : 21 January
Revised : 23 February
Accepted: 23 March

A B S T R A C T

This study aimed to investigate the influence of FABA growing media and chicken manure enriched with blood and rumen sapi bioactivator on the growth and yield of shallot (Allium Ascalonicum L.). The experimental design used was a factorial completely randomized design (CRD) with 2 factors: the first factor was the composition of FABA growing media (F): F0 (Without FABA), F1 (20% FABA), F2 (30% FABA), F3 (40% FABA), F4 (50% FABA), while the second factor was the dose of chicken manure enriched with blood and rumen sapi bioactivator (A): A0 (Without Chicken Manure), A1 (10 ton/ha), A2 (20 ton/ha), A3 (30 ton/ha), each treatment was repeated 3 times. The data were analyzed using ANOVA, and if there were significant differences, DMRT at the 5% level was conducted. The results showed that the composition of FABA growing media significantly influenced plant height (14, 28, and 42 days after planting), leaf number (14, 28, and 42 days after planting), plant fresh weight, plant dry weight, bulb fresh weight, bulb dry weight, and bulb number. Chicken manure enriched with blood and rumen sapi bioactivator significantly influenced plant height, leaf number, plant fresh weight, plant dry weight, bulb fresh weight, bulb dry weight, and bulb number. The interaction between FABA media composition and chicken manure enriched with blood and rumen sapi bioactivator significantly affected plant fresh weight and plant dry weight

DOI: https://doi.org/10.55927/ijis.v4i3.115
E-ISSN: 2985-9050
https://mryformosapublisher.org/index.php/ijis/index

INTRODUCTION

Red onion (Allium ascalonicum L.) is still one of the commodities that have high economic value. In horticultural commodities, shallots become an important item and are always present in the market. Rising onion prices will have an impact on rising prices of other ingredients, especially those still related to food (Fajriah & Noor. 2017).

According to BPS (Badan Pusat Statistik) of Bengkulu Province in 2019, from the 9 districts and cities in Bengkulu, the harvested area in 2018 was 195 hectares, with a production of 9,105 quintals and a productivity of 46.69 quintals per hectare. In contrast, in 2019, the harvested area decreased to 105 hectares, producing 5,234 quintals with a productivity of 49.84 quintals per hectare.

This indicates that the production of red onions in Bengkulu Province increased by 0.06%, but the area of land decreased by 90 hectares within one year. This is usually caused by the land becoming unproductive due to excessive use of chemical fertilizers, resulting in soil degradation.

Many farmers have been using chemical fertilizers. Excessive use of chemical fertilizers can kill microorganisms in the soil, inhibit the decomposition of organic matter, and lead to environmental pollution. This issue can be addressed by applying organic fertilizers derived from animal manure, whether in solid or liquid form, which can help improve soil fertility and enhance the physical, chemical, and biological properties of the soil (Sarawa, Gusnawaty & Sartika, 2014).

Utilization of livestock waste as organic fertilizer is widely used by farmers, one of which can be utilized is manure is relatively easy to obtain containing nutrients that are high enough, namely N 1.72%, P 1.82%, K 2.18%, Ca 9.23%, and Mg 0.86 %. According To (A.Budianto, N. Sahiri & I. S, Madauna, 2015) giving chicken manure to plants at a dose of 10 tons/ha resulted in plant height, number of leaves, number of tubers, and better tuber production compared to other doses of chicken manure. In addition to chicken manure to enrich the nutrient content we can use cow's blood waste.

Bovine blood is an untapped waste, according to (Jamila, 2012) in general, approximately 5-10% of the weight of cattle is a blood component that can contaminate the water/air if disposed of carelessly. The results of research conducted (Nopriansyah, Fiana, and Suryadi, 2017) is known that the provision of cow's blood that has been fermented as a liquid organic fertilizer (POC) with a concentration of 15% gives the highest weight of 100 seeds, namely 10.33 grams, and a concentration of 30%, namely 10.11 grams in soybean seeds. The results of analysis of cow blood liquid fertilizer with rumen N= 7.60% P=0.86%, K= 0.15% (Nopriansyah, Podesta & Suryadi, 2017). So that the nutrients contained in chicken manure and cow blood can be absorbed by plants, we must accelerate the decomposition process using bioactivators.

Bioactivator is a biologically active ingredient that is used to improve the decomposition process. Bioactivators are not fertilizers, but materials that contain effective microorganisms that can actively help decompose and ferment organic waste and livestock waste (Wahyono, 2010), materials used for bioactivators are cow Rumen. According to Ristiani, Fiana & Nurzam (2019),

bioactivator treatment showed a significant effect on plant height, number of pithy pods and weight of soybean planting pods. The application of bioactivator and liquid fertilizer of cow's blood on soybean varieties wilis gives the best results on plant height, number of branches, number of leaves, number of pithy pods, number of seeds and is suitable for cultivation by farmers (Angga, Fiana & Dwi, 2017). To increase the pH of the planting medium can use FABA, FABA is known to have a high pH of 7-8 and nutrients that can help plant growth.

Fly ash (fly ash) and bottom ash (bottom ash) are residual materials from coal combustion, which are collectively often called FABA. This coal burning activity produces about 5% FABA consisting of 10-20% base ash and 80-90% fly ash. The need for coal in 2020 was 66,683,391 tons, so that the waste from coal combustion produced was 3,334,169 tons. We can understand that the libah from burning coal has become a pile of FABA or even a mountain of FABA. So there is a need for research on this FABA in agriculture because FABA has a high Ca content as a substitute for soil Liming so that the pH of PMK planting media in Bengkulu can rise to a neutral pH.

LITERATURE REVIEW

The results showed that the treatment between A1 (Faba 100%), A2 Faba (75%), A3 (Faba 50%) and A4 (Faba 25%) the best growth in A3 and A4 treatment showed that the use of Faba planting media must be balanced by organic matter so that plant growth becomes maximal.(Aziz, Fiana, Nurwiyoto. 2023) based on this background, researchers are interested in conducting research "The effect of FABA planting Media and chicken manure enriched with blood and cow Rumen Bioactivator on the growth and yield of onion (Allium ascalonicum L.)

METHODOLOGY

The tools used in this study are, bucket, hoe, machete, gembor, scissors, digital scales, meter, camera, label paper, and stationery. The materials used in this study are red onion bulbs of Bima Brebes variety, soil media, polybags, chicken manure, cow blood, cow rumen, Fly Ash-Buttom Ash (FABA).

The design used is a complete randomized design (RAL) factorial with 2 factors, the first factor is the composition of the planting media FABA F0 (without FABA), F1 (20% FABA), F2 (30% FABA), F3 (40% FABA), F4 (50% FABA), while the second factor is the dose of chicken manure enriched with blood and bioactivator rumen bovine A0 (without chicken manure), A1 (10) each treatment is repeated 3 times. The results of data analysis using a variety of Fingerprint Analysis and then if different significantly further test Duncan's Multiple Range Test (DMRT) level of 5 %.

The parameters observed include: plant height (cm), number of leaves (strands), wet weight of plants (gr), dry weight of plants (gr), wet weight of tubers (gr), dry weight of tubers (gr), and the number of tubers (fruit).

RESULTS AND DISCUSSION

The results of the study on the effect of Faba planting media and chicken manure enriched with blood and cow rumen bioactivators on the growth and yield of shallot plants show that:

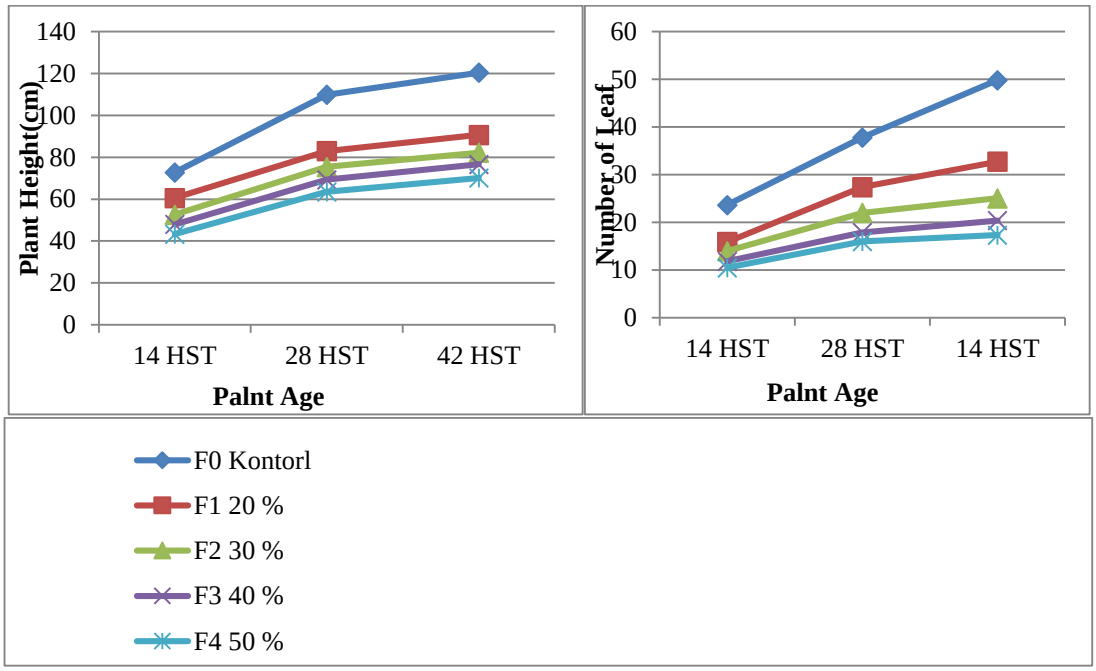


Figure 1. Graph of the Effect of FABA Planting Media on Onion Growth and Yield

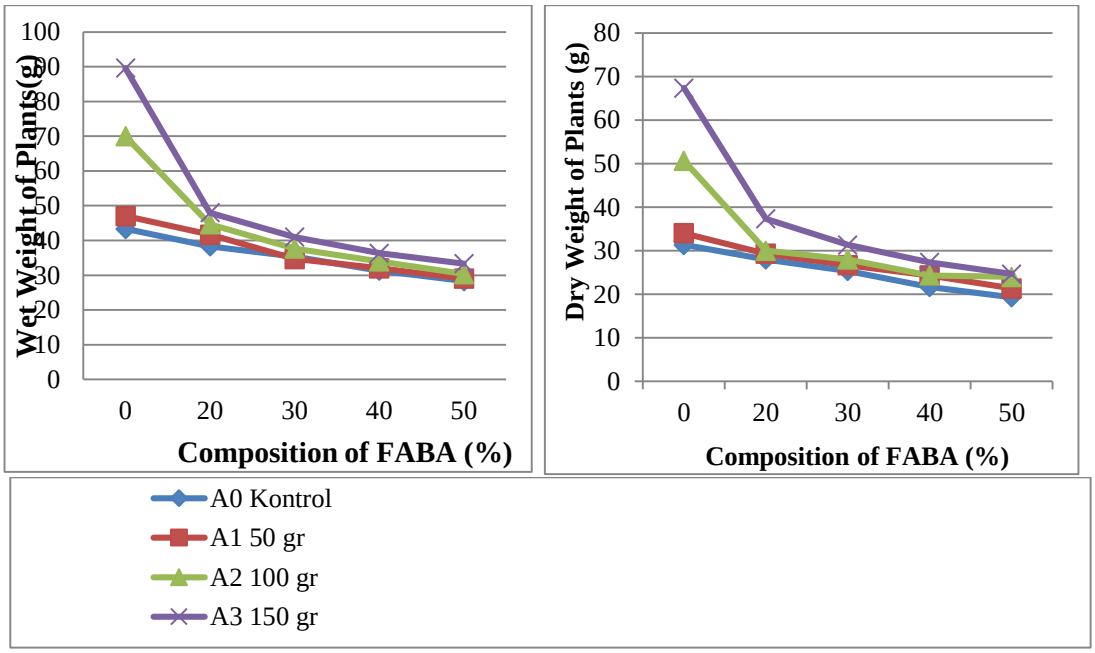
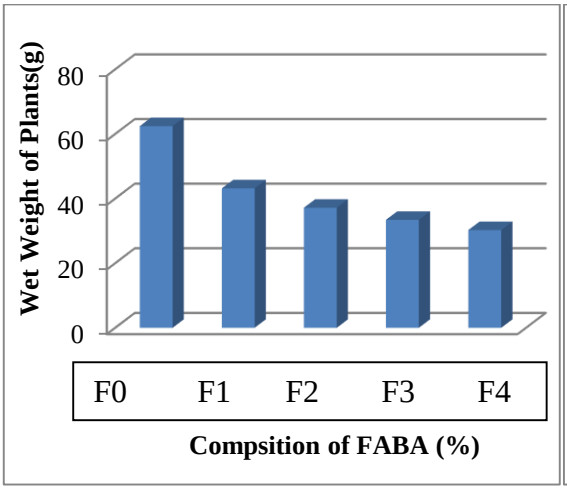
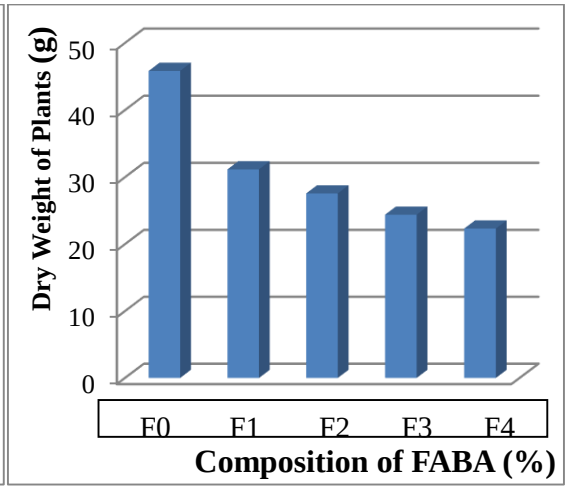
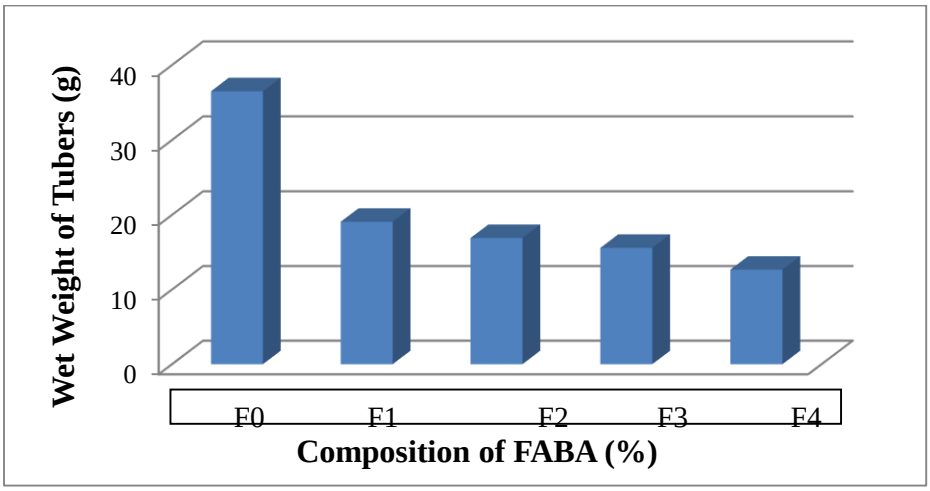
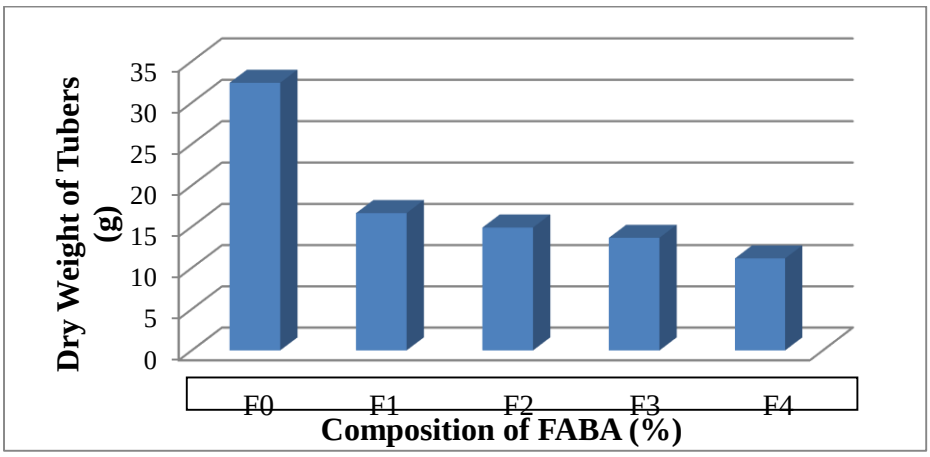


Figure 2. Graph of Interaction Between FABA Planting Media and Chicken Manure Enriched With Blood and Rumen Bioactivator on Onion Growth and Yield


Wet Weight of Plants(g)
80
60
40
20
0
F0
F1
F2
F3
F4
Compsition of FABA (%)


Dry Weight of Plants (g)
50
40
30
20
10
0
F0
F1
F2
F3
F4
Composition of FABA (%)


Wet Weight of Tubers (g)
40
30
20
10
0
F0
F1
F2
F3
F4
Composition of FABA (%)


Dry Weight of Tubers (g)
35
30
25
20
15
10
5
0
F0
F1
F2
F3
F4
Composition of FABA (%)

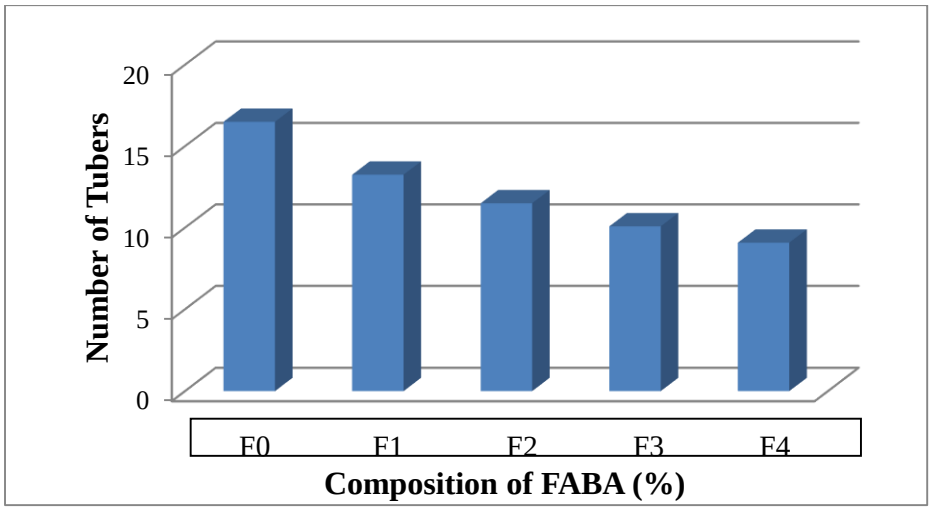


Figure 3. Histogram of the Effect of FABA Planting Media on Onion Growth and Yield

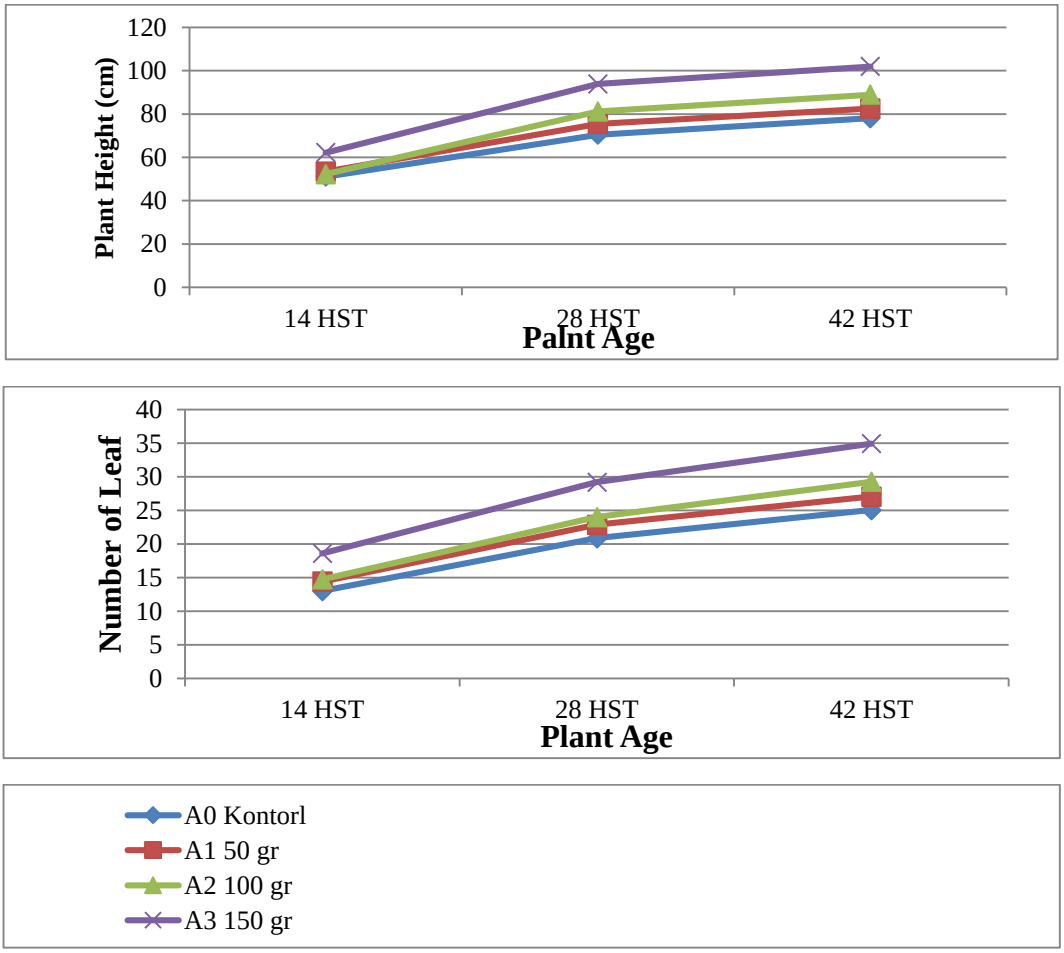
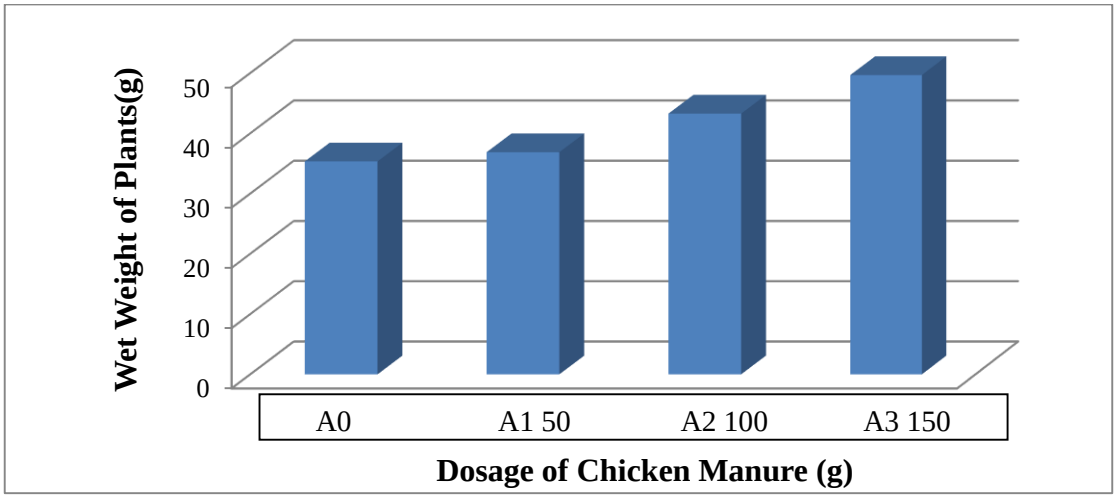
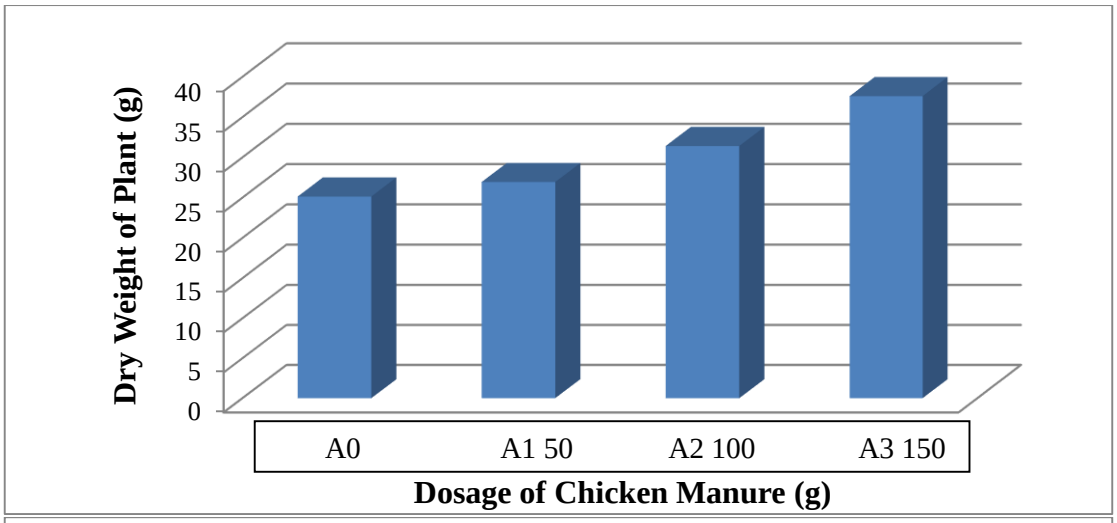
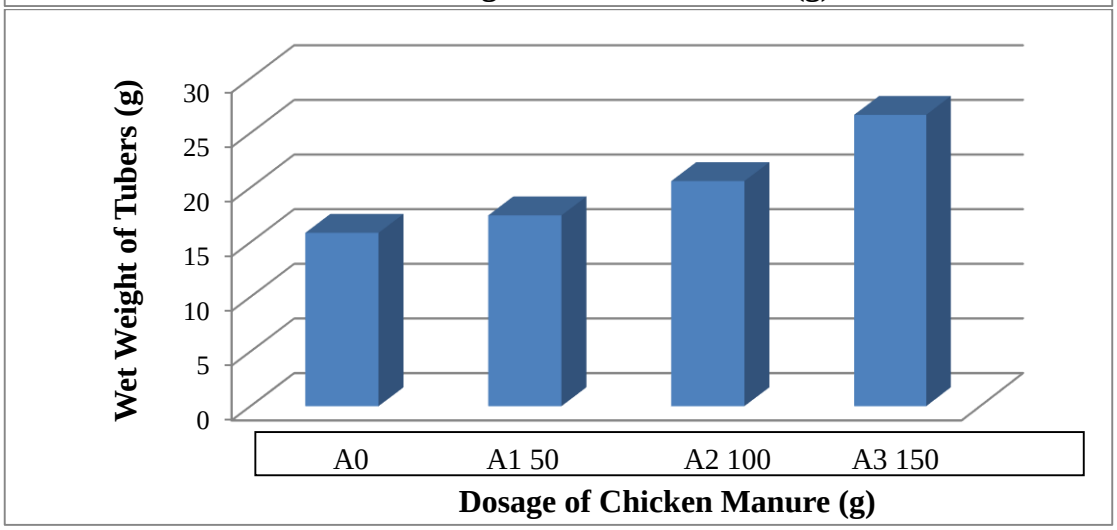
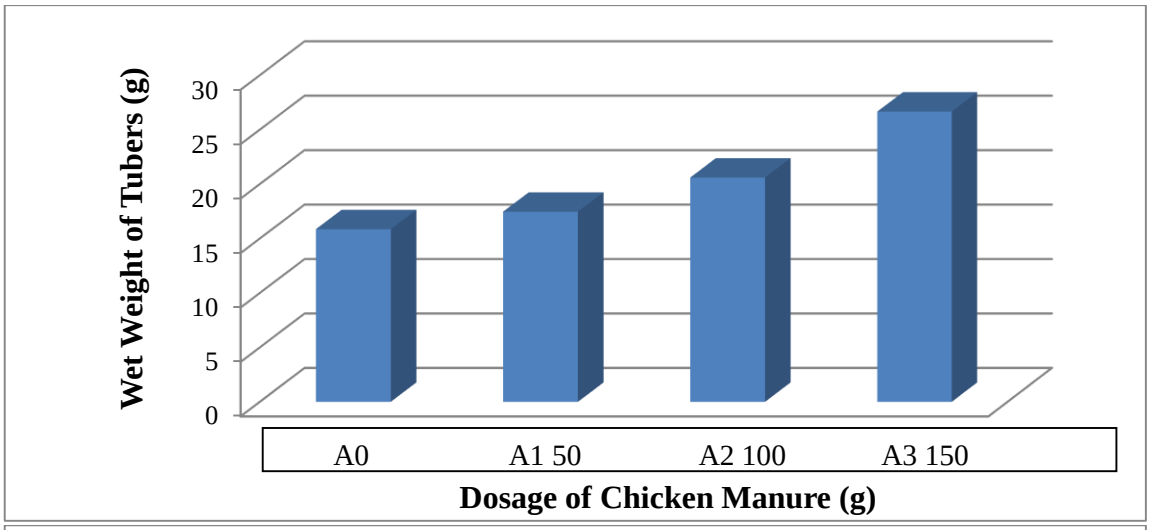


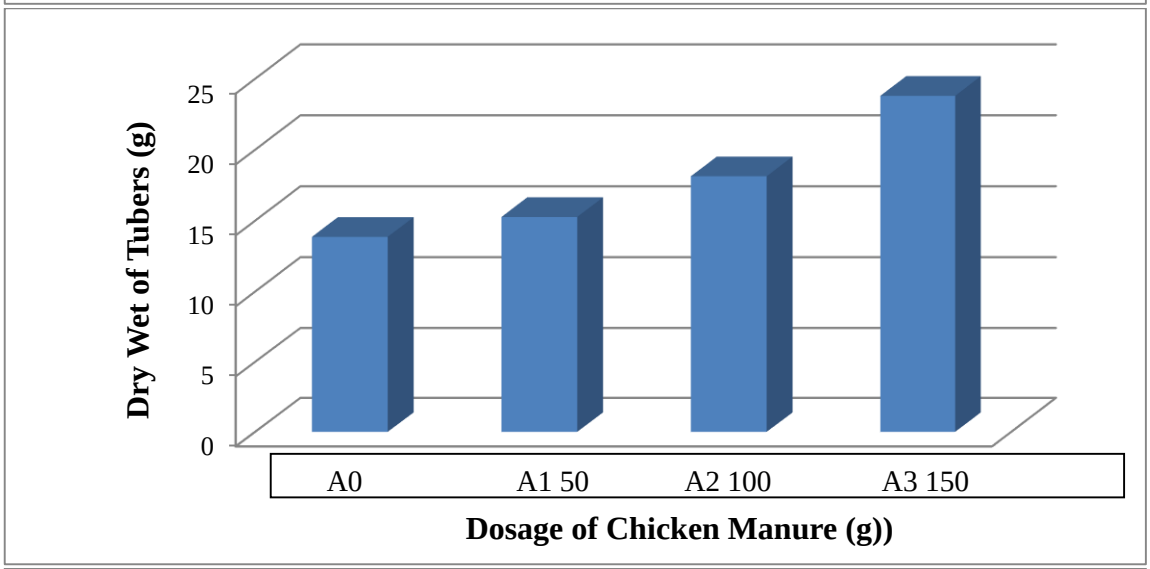
Figure 4. Graph of the Effect of Blood-Enriched Chicken Manure and Bovine Rumen Bioactivator on Onion Growth and Yield

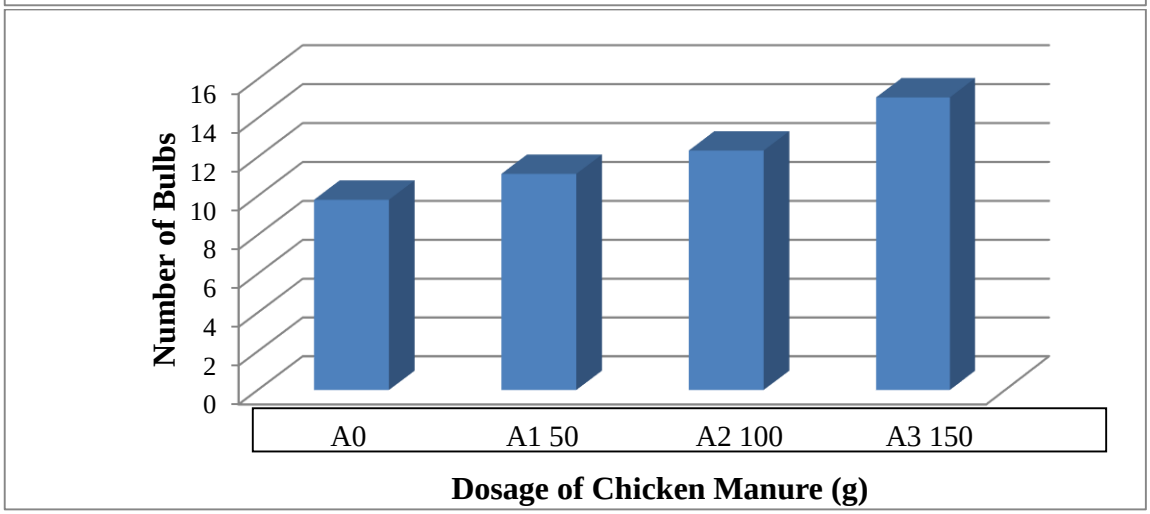

Wet Weight of Plants(g)
50
40
30
20
10
0
A0
A1 50
A2 100
A3 150
Dosage of Chicken Manure (g)


Dry Weight of Plant (g)
40
35
30
25
20
15
10
5
0
A0
A1 50
A2 100
A3 150
Dosage of Chicken Manure (g)


Wet Weight of Tubers (g)
30
25
20
15
10
5
0
A0
A1 50
A2 100
A3 150
Dosage of Chicken Manure (g)


Wet Weight of Tubers (g)
30
25
20
15
10
5
0
A0
A1 50
A2 100
A3 150
Dosage of Chicken Manure (g)


Dry Wet of Tubers (g)
25
20
15
10
5
0
A0
A1 50
A2 100
A3 150
Dosage of Chicken Manure (g))


Number of Bulbs
16
14
12
10
8
6
4
2
0
A0
A1 50
A2 100
A3 150
Dosage of Chicken Manure (g)

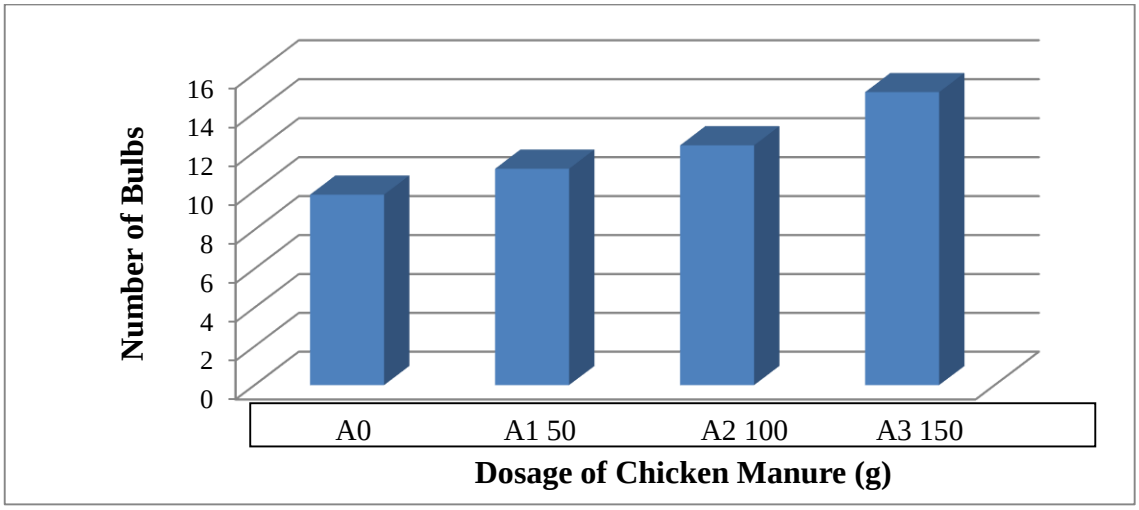


Figure 5. Histogram Effect of Blood-Enriched Chicken Manure and Bovine Rumen Bioactivator on Onion Growth and Yield

FABA as a growing medium capable of reducing soil acidity is characterized by increasing soil pH from 6.2 to 6.5 and continues to increase as the dose of FABA increases. Decrease in soil acidity caused by the liming effect of FABA on the soil because FABA has a high Ca content (Havlin et al. 2017). pH affects the mobility and solubility of essential and nonessential metals in the soil, affecting the activity of microorganisms in the decomposition of organic matter and the provision of nutrients for plants.

Based on the analysis of Variance or ANOVA that the treatment of planting media Composition FABA very real effect on all plant parameters. Based on DMRT (Duncan's Multiple Range Test) that there is a treatment interaction on the parameters of plant wet weight and plant dry weight. Based on DMRT (Duncan's Multiple Range Test) that the treatment of A3 (150 gr) of chicken manure enriched with bovine blood bioactivator gave the highest results on each parameter. This is thought to be because the content of chicken manure contains nutrients that are quite high. Chicken manure contains nutrients N 1.72 %, P 1.82 %, K 2.18 %, Ca 9.23 %, and Mg 0.86%, according to the results of research (Agus, Faridah Wulandari & Purwanto. 2014), that microbial starter in the form of chicken manure contains nutrients N (2.73%). P (0.45%) and K (0.3%), while the types of cellulotic microbes are also quite numerous.

While nitrogen plays an important role as a constituent of chlorophyll, which makes the leaves green. The high nitrogen content makes the foliage greener and able to last a long time. Addition of rumen with bovine blood there are many bacteria that can accelerate the decomposition process, in addition to the rumen and bovine blood contain high organic matter, namely N = 7.60%, P = 0.86% and K = 0.15% (Nopriansyah, Podesta, and Suryadi, 2017).

So it is suspected that this is the cause of the treatment interaction between the composition of FABA planting media and chicken manure enriched with cow's blood bioactivator. The higher the dose of chicken manure enriched with bovine blood with bioactivators is given, the better it will be for plant growth. The provision of chicken manure enriched with bovine blood with bioactivators here

plays an important role in improving the physical properties of FABA planting media which has a high clay so as to make the texture of FABA planting media become crumbly or friable.

Conversely, the lower the dose of chicken manure enriched with bovine blood with bioactivator given, the denser the FABA planting medium will be. So that there is a close relationship between the composition of FABA planting media and the dose of chicken manure enriched with bioactivator. So it is suspected that this linkage is called the treatment interaction. Chicken manure is quite high in nitrogen, so it is also a good medium for the life of microorganisms. With high nitrogen levels in chicken manure, it will be easier to decompose so that the total N levels will also be higher (Kaswinarni, 2016).

While the plant height decreases as the dose of FABA in the soil increases. In appearance, plants with high FABA applications tend to occur inhibition of plant height, so that the red onion leaves appear yellow and the plants look more stunted. The decrease in plant height in media with high doses of FABA is caused by the higher content of heavy metals in FABA. Heavy metals are necessary micronutrients in small amounts and toxic in large quantities. FABA at low doses can modify soil physicochemical properties and the availability of K, P, Mg, and Ca in soil (Haris et al. 2021).

According to Ansari et al. (2022) the highest doses of Ly ash (25-35%) decreased radish growth and yield, increased oxidative stress through increased peroxide lipidtion (MDA) and led to significant increases in ascorbic acid, proline, protein, and antioxidant enzymes.

The results of observations on the wet weight of tubers, the highest dry weight of tubers produced from the planting medium FABA F1, but not significantly different from F2 and F3. The lowest wet and dry dry weight of tubers was produced from the FABA F4 planting medium. The same results occurred in the number of tubers, which showed that the highest number of tubers resulted from the application of planting media FABA F1, but not significantly different from F2. The lowest number of tubers is produced from the growing medium FABA F4. Giving high doses does not always give good growth. response, the plant will absorb nutrients in accordance with their needs, if the nutrients contained in the plant reaches a sufficient amount and balanced, then the plant will grow optimally.

The addition of fly ash buttom ash at the right amount can improve some of the physicochemical and biological properties of the soil. However, high FABA reduces microbial activity that plays a role in nutrient mineralization such as nitrification and nitrogen mineralization and has an impact on roots that are in direct contact with metals (Rucińska-Sobkowiak, 2016).

This indicates that the addition of FABA in the soil can only be given at low doses. The results of the analysis showed that with the increasing dose of FABA, there was a decrease in all variables of plant growth. It is suspected that the heavy metal content in fly ash and coal base ash is a growth inhibitor in onion plants. The addition of FABA will make the soil texture denser so that this will inhibit root growth.

CONCLUSION AND RECOMMENDATION

The interaction between the composition of FABA planting media and chicken manure enriched with bovine blood with bioactivators had a very significant effect on the wet weight parameters of plants and a significant effect on the dry weight of plants.

The composition of Faba planting media has a very significant effect on the parameters of plant height, number of leaves (14, 28, and 41 hst), wet weight of plants, dry weight of plants, wet weight of tubers, dry weight of tubers, and the number of tubers, the highest result in the treatment of Faba planting media composition is F1 (20% FABA)

Chicken manure enriched with bovine blood bioactivator has a very significant effect on plant height, number of leaves (14, 28, and 42 hst), wet weight of plants, dry weight of plants, wet weight of tubers, dry weight of tubers and the number of tubers, based on Duncan's Multiple Range Test (DMRT) the best results are in the treatment of F0A3 (150 g pukan ayam).

FUTHER STUDY

FABA is a waste that has not been widely utilized. So it is necessary to make efforts to utilize FABA as a planting medium by adding bioactivators. Bioactivators are additional materials that can be used as decomposing agents. Utilization of FABA media with the addition of bioactivators is also an effort to increase shallot production.

ACKNOWLEDGMENT

Thank you to everyone who has been involved in carrying out this research.

REFERENCES

A.Budianto, N. Sahiri, I. S, Madauna. 2015. Pengaruh Pemberian Berbagai Dosis Pupuk Kandang Ayam Terhadap Pertumbuhan dan Hasil Tanaman Bawang Merah (Allium ascalonicum L.) Varietas Lembah Palu.

Agus, C., Faridah, E., Wulandari, D., Purwanto, B.H. (2014), Peran Mikroba Starter Dalam Dekomposisi Kotoran Ternak Dan Perbaikan Kualitas Pupuk Kandang, Jumal Manusia dan Lingkungan, 21 (2), 179-187.

Angga, Fiana Podesta, dan Dwi Fitriani. 2017. Aplikasi Bioaktivator Pupuk Cair Darah Sapi Terhadap Pertumbuhan Dan Hasil Beberapa Varietas Kacang Kedelai (Glycine max 1. Merril). https://doi.org/10.36085/agrotek.v1412

Ansari MS, Ahmad G, Khan AA, Mohamed HI, Elhakem A. 2022. Coal fly ash and nitrogen application as eco-friendly approaches for modulating the growth, yield, and biochemical constituents of radish plants. Saudi J Biol Sci. 28: 1-12. DOI: https://doi.org/10.1016/j.sjbs.20 22.103306

Aziz, N., Ananda, J, Maulana, I.H., Andras, L., Podesta, F. & Nurwiyoto, N. (2023). The Effect of faba Growing Media and Cow Manure on thw Growth and Yield of Mustard Greens (Brassica Juncea L.) Nabatia, 11(1), 58-66.

Fajriah, Noor, 2017. Kiat Sukses Budidaya Bawang Merah – Yogyakarta; Biogenesis. 2017.

Haris M, Ansari MS, Khan AA. 2021. of fly ash improve growth and the management of root-knot nematode on carrot. Haya Saudi J. Life Sci. 4, 221-226.

Havlin JL, Beaton JD, Tisdale SL, Nelson WR, Nelson WL. 2017. Soil Fertility and Fertilizers: An Introduction Nutrient Management. Ed ke-4. Antony VR, editor. United States of America: First Chelsea Green Printing.

https://bengkulu.bps.go.id/statictable/2021/06/24/495/luas-panen-produksi-dan-produktivitas-bawang-merah-menurut-kabupaten-kota-di-provinsi-bengkulu-tahun-2018-2019.html (Diakses 20 Mei 2023).

Jamila.2012. Pemanfaatan Darah dari Limbah RPH.[Modul].Teknologi Pengolahan Limbah dan Sisa Hasil Ternak. Fakultas Peternakan Universitas Hasanudin. Makassar.

Kaswinarni, F. (2016). Pengaruh Penambahan Variasi Starter pada Pengomposan Sampah Organik Pasar terhadap Kadar N Total, N Tersedia dan CN Rasio, Prosiding Seminar Nasional Masif II, 152-155.

Nopriansyah, Fiana, dan Suryadi. 2017. Pengaruh Macam-Macam Bioaktivator Dan Konsentrasi Darah Sapi Terhadap Pertumbuhan Dan Hasil Kedelai (Glycine max l. Merrill). https://scholar.google.co.id

Ristiani, Podesta, Nurzam. 2019. Pengaruh Pemberian Pupuk Tepung Darah Sapi Dengan Macam Bioaktivator Dan Trichoderma Terhadap Pertumbuhan Dan Hasil Kacang Kedelai (Glicine max L.merril). https://scholar.google.co.id/citations?user=C3cKbJ8AAAAJ&hl=en

Rucińska-Sobkowiak R. 2016. Waterrelations in plants subjected to heavy metal stresses. Acta Physiol. Planta 38 (11), 1-13. DOI http://dx.doi.org/10.1007/s11738 -016-2277-5)

Sarawa, Gusnawaty, dan Sartika. 2014. Efek Residu Pupuk Kandang Dan Trichoderma Terhadap Pertumbuhan Dan Produksi Tanaman Kedelai (Glycine max l.)

Wahyono, S., 2010 Bioaktivator Composting. http://Sriwahyono.blogspot.com/2010/06/bioaktivator-kompasting-. Diakses pada tanggal 2 April 2023