JIRK
Journal of Innovation Research and Knowledge
Vol.3, No.10, Maret 2024

THE INFLUENCE OF DIFFERENT ORGANIC HORMONES AFFECTS CHANGES IN THE NUTRITIONAL CONTENT OF Azolla Microphylla AS ANIMAL FEED

By
Muhammad Agung Naufal[1], Meriksa Sembiring[2]
[1,2] Program Studi Peternakan Fakultas Sains Dan Teknologi, Universitas Pembangunan Panca Budi
Email: [1]muhammadagungnaufal@gmail.com

Article History:
Received: 17-02-2024
Revised: 25- 02-2024
Accepted: 17-03-2024

Keywords:
Azolla sp, Crude Fiber, Crude Protein, Nutrition, Plant Hormones

Abstract: *This research study aimed to determine changes in nutrition in Azolla sp. plants using several organic hormones and to determine the percentage of increased nutrient content in Azolla sp. plants. The experimental design used by the study was a non-factorial Complete Randomized Design (RAL), with 4 treatments and 5 repeats, The treatments tested are Z0 (without hormones, Z1 (banana weevil), Z2 (bean sprouts), and Z3 (sweet potato shoots). Hormones were tasted, taken from plants by adding EM4 bioactivators, and differentiated molasses for one week, except hormones from bean sprouts. The three fermentation results are complete and can be used as a planting medium for Azolla sp. The parameters observed were Changes in nutrition (crude protein, fat, and crude fiber in %) in Azolla sp. who are given some hormones from plants. The data obtained are tested by t-test. From the results of the research analysis that has been analyzed, it was found that the use of hormones derived from plants is very influential in increasing protein, increasing fat percentage, and reducing crude litter content in Azolla plants after being given various plant hormones. Of the three types of hormone origin, the best in increasing protein and fat and decreasing crude fiber was Z3>Z1>Z2 compared to Z0 treatment (control)*

INTRODUCTION

Azolla sp. plants are aquatic ferns whose leaves float on the surface, while the roots hang underwater. Often found in puddles, gutters, ponds, rice fields, lakes, or rivers. How to cultivate *Azolla sp*. is very easy. Apart from that, Azolla sp can be cultivated using trays, dams, ditches, and tarpaulin ponds, if not using earthen pools. Healthy *Azolla sp.* plants have a growth rate of 35% per day. Generally, it can be harvested within 7 to 15 days. *Azolla sp*. plants that are ready to be harvested will accumulate thickly to fill the surface of the

pond. For plants to continue to develop and not buy new seeds, you should take enough *Azolla sp*. plants, or about 50% only when harvesting. Furthermore, it can be harvested once every 1-2 weeks.

Nutrient content *Azolla sp*. consists of Macroelements (N; 3-5%, K: 2–4.5%, P: 0.5–0.9%), Microelements (Ca: 0.4–1%, Mg: 0.5–0.6%, Fe: 0.06–0.26%, Mn: 0.11–0.16%). In addition to having complete nutrients, *Azolla sp*. plants also have a C/N ratio of 12-18. So *azolla sp*. plants are suitable for use as a mixture of animal feed such as ducks, chickens, goats, and cows. According to Rachman Sutanto (2002), the addition of *Azolla sp*. plants to chicken feed is limited to around 15% because it can interfere with egg productivity. Giving *Azolla sp*. plants to dairy cows is believed to increase milk productivity by up to 15%. Giving azolla as feed is given in fresh, dried, or fermented.

In increasing the growth of *Azolla sp*. apart from the application of organic fertilizers can also be the use of plant hormones that can stimulate growth, such as the use of hormones in the form of Growth Regulators (ZPT) or hormones, ZPT or plant hormones (phytohormones) are organic compounds that are not nutrients, ZPT in small amounts can spur, inhibit and can change plant physiological processes (Pranata. 2004).

According to Lindung (2014), banana weevils contain cytokinin hormones. Cytokinins are adenine-derived compounds that play a role in regulating cell division and morphogenesis. Cytokinins can stimulate bud formation, affect cell metabolism, and stimulate dormant cells (Karjadi & Buchory, 2008).

Green bean sprouts (bean sprouts) contain a natural hormone, namely auxin hormone, where hormone auxin (Astuti and Y. Amilah, 2006; Diana, et al, 2012), has functions in cell division, root growth (in vitro culture), phototropism, geotropism, parthenocarpy, apical, dominant, callus formation Ulfa (2014) and Khair, *et al* (2013).

The shoots of yam plants contain a lot of phytohormones, the two main ones are Gibberellin and Auxin. Both of these hormones are ZPT which has an important role in accelerating plant growth and development. (Juanda. D and C. Bambang. 1995)

Increased production of *Azolla sp*. can be done with the addition of hormones such as auxin hormone supports root growth but inhibits bud growth and also inhibits flowering and fruiting. Cytokinin hormones support bud growth but inhibit root growth, and inhibit and fertilization

METHOD

This research was conducted in Sunggal District, Deli Serdang Regency, North Sumatra Province. The method used is a non-factorial Complete Randomized Design (RAL) experimental method consisting of 4 treatments in the form of hormones from plants with 5 repeats so that there are 20 research plots. The treatment in this study consists of:

Z0 : (control) without treatment,
Z1: Hormones from banana weevils,
Z2: Hormones from bean sprouts,
Z3: hormone from sweet potato shoots

Preparation procedure hormones from plants

1. Hormone preparation from banana weevils

Prepare 1 kg of banana weevils chopped until smooth, then add 1 liter of water, then stir, and add EM4 1 bottle caps, and molasses 3 bottle caps. Then stir until smooth, put into a tightly closed container, then store for 1 week. After one week, filtered and taken the water as a hormone banana weevil.

2. Hormone preparations from bean sprouts

Prepare 1 kg of bean sprouts chopped until smooth then add 1 liter of water, then stir, and then add EM4 1 bottle cap and molasses 3 bottle caps. Then stir until smooth then, put into a tightly closed container, and store for one day. After one day of filtering and taking the water as a bean sprout hormone.

3. Hormone preparation from sweet potato leaves

Prepare 1 kg of sweet potato leaves chopped until smooth, then add 1 liter of water, then stir and add EM4 1 bottle cap, and molasses 3 bottle caps. Then stir until smooth, put into a tightly closed container, and store for one week. After one week, filtered and taken water as an hormone sweet potato leaves.

Sample Preparation

A total of 20 trays are placed on top of the pond for all treatments and repeats. Each tray is given 5% hormones from plants according to their respective treatments and mixed with water, each in the tray and above the water surface planted by *Azolla sp*. A total of 40 grams consisting of 4 batches. After the age of 28 days, *Azolla sp*. Ready to harvest and dry. After drying, Azolla is floured (blended), and its nutritional content consists of crude fiber, crude protein, and fat, and the increase in each nutrient. The data was then analyzed using Analysis of by statistical analysis of a t-test to determine the effect of various plant hormones on the nutrition of *Azolla sp*.

RESULTS AND DISCUSSION.

The results of experiments in the field of the effect of organic hormones on changes in protein content and crude fiber of Azolla microphylla plants and after statistical analysis at 28 days after planting (hst) showed a real difference ($p < 0.05$) both on fat content showed no real difference ($p > 0.05$), for more details can be seen in the following.

Crude Protein

Data and analysis results of research results of the addition of various hormones from several parts of plants there are changes in protein content as shown in Table 1 below:

Table 1. The average protein content is given plant homone

Treatment	Average		Improvement	
	(%)	Stdev	(%)	
Z0 (Control)	20,82	0,82	0	
Z1 (Banana Weevil)	25,41	0,52	22,02	
Z2 (Bean Sprouts)	22,38	0,79	7,49	
Z3 (Sweet Potato Shoot)	27,76	0,87	33,31	

Description: Stdv : Standard Deviation

Table 1 shows the influence of hormones from several types of plants given to *Azolla sp*. There are different changes for each type of plant hormones given. The Z0 treatment (control) obtained the lowest protein content, which was an average of 20.82%, with a protein content that was close to the same as the Z2 treatment (bean sprout hormone), with an average of 22.38%. Z3 treatment (sweet potato leaf hormone) has the highest protein content, which is an average of 27.76%, with the percentage of Z1 treatment (banana weevil hormone) on average 25.41% with an increase in protein content of 33.31%, compared to Z0 treatment (control). Furthermore, the protein content that is lower and closer to the same compared to Z3 is Z1 with an average protein content of 25.41% with an increase in protein content of 22.02%.

Of the three plant hormones, the lowest increase in protein content was the Z2 treatment (bean sprouts), with an average of 22.38% with an increase, of 7.49% compared to Z0. So, from Table 1, it can be concluded, that the use of sweet potato hormones and banana weevils is the best treatment to increase the protein content given to *Azolla sp*. Plants.

The use of different plant hormones as fertilizing plants Azolla sp. gives changes to the nutritional content of Azolla sp. which shows a real difference, this is because, in plant extracts in addition to stimulating substances or hormones, there are also nutrients (Kurnia M. 2014), which can increase the nutrient content in water media to increase nutrients in plants (Azolla sp) planted. Of the three hormones derived from different plants for the development of Azolla sp., the most response was the use of hormones from sweet potato leaf plants (Z3) and hormones from banana weevils (Z1), resulting in the highest protein content with an average of 27.76% and 25.14% respectively increased protein content by an average of 33.31% and 22.02%.

Adewolu (2008) stated that sweet potato leaves contain high crude protein, which is 26-35%, with good mineral content, and also vitamins A, B2, C, and E., The same opinion is also, expressed by Nguyen and Ogle (2004) reported that sweet potato leaves contain crude protein about 24-29%. The results of Miftakhurrohmat's research, Dewantara, D., (2020) were tested on other plants using sweet potato hormones tested using a dose of 20 ml / l of water to produce the best.

Crude Fat

Measurement and statistical analysis of changes in fat content resulting from the influence of the use of several plant hormones given to Azolla sp. showed close to the same from the three types of plant hormones Z!, Z2, and Z3), the results can be seen in Table 2 below:

Table 2. Average fat content given plant homon

Treatment	Average		Improvement
	(%)	Stdev	(%)
Z0 (Control)	2,58	0,34	0
Z1 (Banana Weevil)	2,68	0,12	3,80
Z2 (Bean Sprouts)	2,63	0,29	2,09
Z3 (Sweet Potato Shoot)	2,70	0,26	4,73

Description: Stdv : Standard Deviation

Table 2 shows the effect of hormones from several plants given to *Azolla sp*. There is a slight change in each different type of plant hormone (Z1, Z2, and Z3). Zo treatment (control) has the lowest fat content on average 2.58%, with fat content close to the same as the three types of hormone origin with an average fat content of 2.63 – 2.68%. Z3 treatment (sweet potato leaf hormone) has the highest protein content on average 2.70% with a percentage of fat that does not differ in Z3 > Z1 > Z2 content.

Giving different hormones to *Azola sp*. changes the percentage of fat content. The highest fat was Z3, with an average fat increase of 4.73%, followed by Z1 treatment (banana weevil 3.80% and the use of bean sprout hormone (Z2) only increased by an average of 2.09%. So from Table 2, it can be concluded that the use of sweet potato hormone (Z3), Pisa weevil hormone (Z1), and bean sprout hormone (Z2) is what does not provide a noticeable increase in fat content in *Azolla sp*. plants with relatively small changes in fat content compared to controls (Z0).

Plant hormones are natural hormones obtained from young plant tissues Arif et al. (2016). The results of the studies showed that the three types of plant hormones can change the fat content in the nutrition of Azolla sp plants with an increase of 2.09 – 4.73%., with an increase no different than the control treatment (without plant hormones). This is because, in the use of the three plant hormones, apart from containing hormones, there are also nutrients and nutrients needed by plants.

Crude Fiber (SK)

The crude fiber content of Azolla sp. with the administration of hormones from several plants can change the crude fiber content. The results of statistical analysis for Crude Fiber content (%) can be seen in Table 3 below:

Table 3. The average crude fiber content is given plant homone

Treatment	Average		Improvement	
	(%)	Stdev	(%)	
Z0 (Control)	12,21	0,52	0	
Z1 (Banana Weevil)	11,91	0,98	2,47	
Z2 (Bean Sprouts)	12,11	0,63	0,85	
Z3 (Sweet Potato Shoot)	12,02	0,97	1,62	

Description: Stdv : Standard Deviation

In Table 3, it can be known the influence of hormones from several plants given to *Azolla sp.* There was little change from each different type of plant hormone (Z1, Z2, and Z3) compared to the control (Z0). Zo treatment (control) has a high crude fiber content with an average of 12.21%, where the crude fiber content there is a slight decrease in crude fiber with the addition of plant hormones (Z1, Z2, and Z3). The crude fiber content with close to the same against the control.

Based on the results of the analysis, with a t-test using Stdev. it was seen that the three types of hormone origin with crude fiber content were not significantly different from the average value of 11.91 – 12.11. Z1 treatment (banana weevil hormone) has the lowest percentage of crude fiber, with an average value of 11.91%, a percentage of crude fiber that is not different, and the content is Z3<Z1<Z2. Giving different hormones to *Azola sp*. changes the percentage of crude fiber content, the lowest crude fiber content is Z3

(sweet potato leaves). The percentage decrease in, crude fiber content with the largest decrease occurred in the Z1 treatment (banana weevil), with a decrease of up to 2.47%, while the Z3 treatment (sweet potato hormone), with an average decrease in crude fiber content of 1.62%, while the lowest decrease was found, in Z2 treatment (bean sprouts), with an average decrease of 0.85%.

Crude fiber is part of the feed material consisting of cellulose, hemicellulose, lignin, and other polysaccharides that function as protective parts (Anggorodi, 1994). The treatment of the use of hormones from plants can not increase fiber, does not increase the crude fiber content in Azolla sp, but obtained decreased fiber content from all four treatments. The average crude fiber obtained only ranged from 11.91% to 12.21%. The use of plant hormones did not affect crude fiber, when compared to the control treatment, there was only a very low decrease of an average of 0.85 – 2.47%.

CONLUSIONS

Testing several hormones from plants, namely sweet potato shoots (Z3) and banana weevils (Z1) is the best hormone to increase the nutritional content in Azolla sp. plants as animal feed

REFERENCES

[1] Agus, Setiawan., (2006), Pengantar Statistika, Graha Ilmu, Yogyakarta
[2] Adewolu MA. 2008. Potentials of sweet potato (Ipomoea batatas) leafmeal asdietary ingredient for Tilapia zilli fingerlings. Pak J Nutr 7(3): 444-449
[3] Anggorodi, R., 1994. Ilmu Makanan Ternak Umum. PT Gramedia, Jakarta.
[4] Arif, M. (2016). Bahan Ajar Rancangan Teknik Industri. Yogyakarta: Deepublish
[5] Arifin. 2003. Azolla, Pembudidayaan dan Pemanfaatan Pada Tanaman Padi. Penebar Swadaya: Jakarta.
[6] Astuti dan Y. Amilah, 2006.Pengaruh Konsentrasi Ekstrak Taoge dan Kacang Hijau pada Media Vacin dan Went (VW) terhadap Pertumbuhan Kecambah Anggrek Bulan (*Phalaenopsis amabilis* L.).Buletin Penelitian No. 09.
[7] Diana, Novita, S. Surti Kurniasih, dan R. Teti Rostikawati, 2012. Pengaruh Pemberian Mikroorganisme Lokal (MOL) Bonggol Pisang Nangka terhadap Produksi Rosella.Fakultas Keguruan dan Ilmu Pendidikan Universitas Pakuan Bogor.
[8] Kartadisastra, H.R. 2001. Penyediaan dan Pengelolaan Pakan Ternak Ruminansia. Kanisius. Yogyakarta
[9] Kementerian Pertanian Republik Indonesia. 2023. Laporan Tahunan 2022. Direktorat Jenderal Tanaman Pangan. Jakarta.
[10] Khair. 2013. Pengaruh konsentrasi ekstrak bawang merah dan air kelapa terhadap pertumbuhan stek tanaman melati putih (Jasmin sambac L.). Jurnal Argium 2013. Vol. 18. No. 2
[11] Kurnia IGA. M, 2014. Hormon Tumbuhan. Dinas *Pertanian* PP.Madya Distanak Kab.Buleleng
[12] Maspary. 2012. Apa Kehebatan Mol Bonggol Pisang. Jakarta (ID): Gramedia Maspary. 2012. Apa Kehebatan Mol Bonggol Pisang. Jakarta (ID): Gramedia
[13] Miftakhurrohmat A dan , M. D. Dewantara, 2020. Aplikasi Fitohormon Ekstrak

Tauge Terhadap Pertumbuhan Tanaman Cabai rawit (*Capsicum frutescens* L.). Program Studi Agroteknologi, Universitas Muhammdiyah Sidoarjo, Indonesia Nabatia. 8:2

[14] Murtidjo. 2000. Beternak Ayam Broiler .Kansius.Yogyakarta.

[15] Muvidah, S., R. B. Kiswardianata dan M. W. Ardhi. 2017. Pengaruh Konsentrasi Perendaman Ekstrak Bonggol Pisang dan Air Kelapa Terhadap Pertumbuhan Kacang Hijau (Phaseolus radiatus). Prosiding Seminar Nasional SIMBIOSIS II, Madiun

[16] Nguyen TT, Ogle B. 2004. The effect of supplementing different green feed (water spinach, sweet potato leaves and duck weed) to broken rice based diets on performance, meat and egg yolk colorof luong phuong chickens. Department of Animal Nutrition andManagement, Sweden

[17] Nurhajati. T dan T.Suprapto , Penurunan Serat Kasar dan Peningkatan Protein Kasar Sabut Kelapa (Cocos nucifera Linn) Secara Amofer dengan Bakteri Selulotik (Actinobacillus ML-08) Dalam Pemanfaatan Limbah Pasar Sebagai Sumber Bahan PakanN.)Department of Animal Husbandry Faculty of Veterinary Medicine Airlangga University, Surabaya

[18] Pranata.2004. Pupuk Organik Cair Aplikasi dan Manfaatnya.Agromedia pustaka. Jakarta.

[19] Rahayu, E.P. D. Saefulhadjar dan , H. Supratman.2023. Perubahan Kandungan Protein Kasar dan Bahan Kering pada Kacang Kedelai yang Difermentasi dengan Probiotik Heryaki Cair. Jurnal Sumber Daya Hewan Vol. 4 No. 1.

[20] Rimando T.J. 1983. Chemical control of plant growth. Dalam Bautista O.K. et al. *Introduction to Tropical Agriculture*. Department of Horticulture, College of Agriculture, University of The Phillippines at Los Baños. Manila. Hal. 266

[21] Sutanto, Rachman. 2002. Pertanian organik: Menuju Pertanian Alternatif dan Berkelanjutan. Kanisius. Jakarta.

[22] Syafria, H. (2009). Efek zat perangsang tumbuh sintetik dan alami terhadap pertumbuhan dan produksi rumput lokal Kumpai (Hymenachne amplexicaulis (Rudge)Nees). . Jurnal Akta Agrosia 7, 45–49.

[23] Tangapo, A. M. (2020). Potensi Bakteri Endofit Ubi Jalar (Ipomoea batatas L.) dalam Menghasilkan Hormon Indole Acetic Acid (IAA) dengan PenambahanL-Triptofan. Bios Logos, 10(1), 21-26.

[24] Ulfah, M. 2014. Hubungan Diastasis Recti Abdominis dengan Nyeri Punggung Bawah pada Ibu Hamil. Jurnal Bidan Prada, 5 (2), pp. 23-30.

[25] Varalakshmi dan Malliga. 2012. Evidence for production of Indole-3-acetic acid from a fresh water cyanobacteria (*Oscillatoria annae*) on the growth of H.Annus. International Journal of Scientific and Research Publications. 2(3): 1-15.

THIS PAGE IS INTENTIONALLY BLANK

 ISSN 2798-3471 (Cetak)
ISSN 2798-3641 (Online)