

# Use Of Liquid Organic Fertilizer Fish Waste And Chicken Manure Fertilizer On The Production Of Pumpkin (*Cucurbita Moschata*)

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## **Abstract.**

*The study was carried out at altitude of ± 27 mdpl using factorial randomized block design (RAK). Firstly, Fish Waste POC (P) with 3 treatment levels, P1 = 20 ml/l water, P2 = 30 ml/l water and P3 = 40 ml/l water. Secondly, Chicken Manure (K) with 3 treatment levels, K1 = 0.75 kg/plot, K2 = 1.5 kg/plot and K3 = 2.25 kg/plot. The observed parameters were fruit length, fruit diameter, number of fruit per plot and fruit weight per plot. Based on the study, it was found that Fish Waste POC did not significantly affect on all the parameters observed. Chicken manure had a significant effect on the observed parameters, fruit length, fruit diameter and fruit weight per plot, while the combination of both treatments showed that there was no significant effect on all observed parameters.*

**Keywords:** Pumpkin, Fish Waste POC, Chicken Manure.

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## **I. INTRODUCTION**

Pumpkin is from North America. Pumpkin can grow well with sufficient rainfall throughout the year. In Indonesia, this pumpkin is still classified as a new type of plant and because of limited stock and the farmers have not cultivated it much. Even now, this pumpkin is still 'exclusive'. Recently, pumpkin has become a trend in some circles as an alternative food and it can be found easily in some modern markets. The taste of this pumpkin is sweeter than the local pumpkins and so is its soft texture. It contains more calcium which is good for bone growth. Apart from being an alternative food, pumpkin is popular as well as a complementary food for breastfeeding that highly nutritious for young mothers who have children from one year old to under five years old. This round pumpkin has variety nutrient content such as vitamin A, iron, folic acid, and high fiber. The orange color of pumpkin contains carotene, antioxidant that converts vitamin A and reduce the risk of cancer. Pumpkin also contains B complex vitamins such as folate, niacin, vitamin B-6, thiamin, pantothenic acid, as well as mineral such as copper, calcium, iron and phosphorus (Kurniati *et al*, 2018).

One of the efforts that can be done to improve the welfare of farmers is by cultivating plants that have high economic value. Moreover, this pumpkin has higher price than the local pumpkin and it is still a rare plant for the farmers at several places in Indonesia. This pumpkin is a good prospect to be developed to increase food diversity as an alternative foodstuff with high nutrition and for the farmers' income as well (Imani and Mudji, 2019). To support the program from the government in creating healthy environment and society of its implementation is by a sustainable agricultural system in creating an environment with socio-economic, ecological principles. In this case, it is very important to pay attention to inputs to maintain environmental quality and utilize natural resources as one of the managements in cultivating plant species. The solution to improve and to maintain safe environment for living things, especially for human safety from hazardous materials of agricultural products that will be consumed by utilizing organic materials in Indonesia and expected to be free from harmful substances. Organic fertilizer is one of the fertilizer that has good potential to improve the land that is used as plant media because of containing macro and micro nutrients needed by plants.

Fish waste can cause pollution if it is left therefore it should be fermented first, with the elements contained to decompose that can be absorbed easily by the plants and chicken manure. In this study, to support sustainable agriculture, fish waste is processed into POC and chicken manure will be processed into compost. Fish waste has the potential to pollute the environment and cause various diseases. The content of

N and protein of fish waste can be used as the essential nutrient such as N, P, K that needed by plants (Efendi *et al.*, 2016) and (Suartini *et al.*, 2018).Chicken manure has higher P nutrient content than other manure. P element that can help root growth, stimulate the formation of flowers and fruit and as a source of plant assimilation and respiration (Andrians *et al*, 2015).Based on this information, the authors conducting research using organic materials to cultivate pumpkin in producing healthy environment and products that will be consumed well by the consumers.

**II. METHODS**

This research was carried out in September 2020 in land at an altitude of ± 27 mdpl. The materials and tools were F1 pumpkin seeds, fish waste, EM4, brown sugar, water, chicken manure, insecticide Regent 50 SC and fungicide Antracol 70 WP. hoe, saw, PH mulch, gembor, tape measure, machete, knife, signpost, scissors, bucket, plastic, bamboo, raffia rope, wire, bamboo.This study used a factorial randomized block design (RAK). Firstly, Fish waste has 3 treatment levels, P1 (20 ml/L water/plot) P2 (30 ml/L water/plot) and P3 (40ml/L water/plot). secondly, chicken manure has 3 treatment levels, K1 (0.75 Kg/plot), K2 (1.5 Kg/plot) and K3 (2.25 Kg/plot).The parameters observed were: fruit length (cm), fruit diameter (cm), number of fruit per plot (fruit) and fruit weight per plot (Kg).

**III. RESULT AND DISCUSSION**

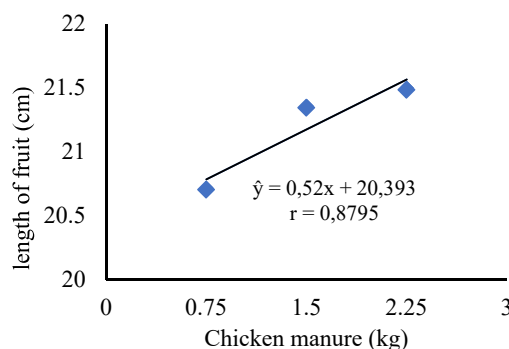
**Fruit Length**

Observation data on fruit length on use of fish waste and chicken manure according to Duncan's method can be seen in table 1.

**Table 1.** the average of Fruit Length on use of Fish Waste POC and Chicken Manure.

Treatment	Chicken Manure			Average
	K <sub>1</sub>	K <sub>2</sub>	K <sub>3</sub>	
POC	.....(cm).....			
P <sub>1</sub>	20,56	21,44	21,31	21,10
P <sub>2</sub>	20,64	21,40	21,24	21,09
P <sub>3</sub>	20,89	21,19	21,90	21,33

Note: Numbers followed by unequal letters in the same row are significantly different according to the 5% DMRT Test.Based on the table 6, it can be seen that the fruit length using chicken manure treatment with the lowest average was found in K1 treatment (20.70 cm) that significantly different from K2 (21.34 cm) and K3 (21.48 cm) treatments. It is assumed that the use of chicken manure at a dose of 2.25 kg/plot can produce longer fruit. Sari et al (2016) stated that chicken manure contains Nitrogen (N) 2.44%, Phosphorus (P) 0.67%, Potassium (K) 1.24%, and C-Organic 16.10%. The content of N, P, and K in chicken manure has high nutrient levels, improve fertility levels for infertile land and increase crop production. The higher dose of manure to the plants, the larger plant size and production. Furthermore, the POC treatment of fish waste did not significantly affect the fruit length parameters due to low level of nutrients in fish waste POC. According to Elvina et al (2018) to support plant growth and yield it is necessary to enter nutrients from outside such as the provision of suitable fertilizers for cultivated plants.The length of this pumpkin with the use of chicken manure can be seen in picture 1.



**Fig 1.** Pumpkin length chart with the use of chicken manure

The picture 1 showed that fruit length increased by 2,25 kg/plot with positive linier and  $\hat{y}$  equation =  $0,52x + 20,393$ , while  $r = 0,8795$ . From the picture above, it can be seen that the use of 2,25 kg/plot K3 chicken manure had the best result from the fruit length with an average 21.48 cm as chicken manure can increase the fruit length. The more doses of chicken manure given, the longer the fruit length will be.

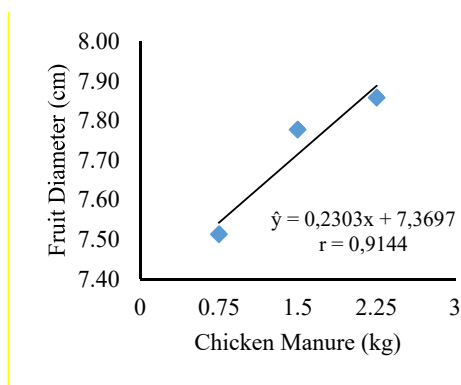
**Fruit Diameter**

The observation data of fruit diameter on fish waste and chicken manure according to Duncan's method in table 2.

**Table 2.** The average of fruit Diameter on Provision of Fish Waste POC and Chicken Manure.

Treatment	Chicken Manure			Average
POC	K <sub>1</sub>	K <sub>2</sub>	K <sub>3</sub>	
	.....(cm).....			
P <sub>1</sub>	7,50	7,80	7,51	7,60
P <sub>2</sub>	7,52	7,76	7,95	7,74
P <sub>3</sub>	7,52	7,77	8,12	7,80
Average	7,51 b	7,78 a	7,86 a	7,72

Note: Numbers followed by unequal letters in the same row are significantly different according to the 5% DMRT Test .Based on the table 2, it showed that fruit diameter in treatment of chicken manure with the lowest average was found in K1 treatment (7.51 cm) which was significantly different from K2 (7.78 cm) and K3 (7.86 cm) treatment. It is assumed that the application of chicken manure at a dose of 2.25 kg/plot produced larger fruit diameter. The content of sufficient K nutrients in chicken manure can stimulate fruit growth in plants in order that the size, taste and color of the fruit will be maximized. According to Atmaja's (2017) statement, potassium is a mobility nutrient in soil that plays a major role in transporting photosynthetic products from leaves to reproductive and storage organs, including fruit, seeds and tubers. Safuan (2007) states that sufficient amount of K nutrients can guarantee the function of leaves in fruit growth and the amount of sugar in fruit, then K nutrients can improve fruit size, taste and color. Furthermore, the use of fish waste POC had no significant effect on the diameter parameters of the pumpkin due to low nutrients in the POC of fish waste used. According to the statement of Pasta et al (2015) plants will not have maximum crop yields when the important nutrients are not sufficiently available. Fertilization can increase crop yields both quantitatively and qualitatively. Fruit diameter of pumpkin with chicken manure can be seen in picture 2.



**Fig 2.** Chart of pumpkin diameter used chicken manure.

Picture 2 shows that fruit diameter with an increase 2.25 kg/plot has a positive linear relationship with the equation  $\hat{y} = 0.2303x + 7.3697$ , with  $r = 0.9144$ . From the picture above, the use of K3 chicken manure 2.25 kg/plot, has been able to show the best result from pumpkin diameter with an average 7.86 cm. Therefore chicken manure can improve fruit diameter. The more dose of chicken manure given, the more the diameter of the fruit will increase.

### Number of Fruit per Plot

Observation data on the number of fruit per plot used fish waste and chicken manure according to Duncan's method can be seen in table 3.

**Table 3.** Average Number of Fruit Per Plot on used Fish Waste POC and Chicken Manure.

Treatment	Chicken Manure			Average
	K <sub>1</sub>	K <sub>2</sub>	K <sub>3</sub>	
POC				
	.....(buah).....			
P <sub>1</sub>	6	6,25	6,5	6,25
P <sub>2</sub>	6,25	6	6	6,08
P <sub>3</sub>	6,5	6	6	6,17
Average	6,25	6,08	6,17	6,17

From table 3 the number of fruit per plot use fish waste POC and chicken manure and their interactions did not significantly affect the number of pumpkin per plot due to secondary branch pruning in order that the number of pumpkin was limited to the primary branches. According to the statement of Sukmawati et al (2018) pruning means removing plant parts that are not needed such as tendrils, leaves, shoots, stems, or water shoots. Pruning aims to streamline plant growth and development to be more productive. Another goal is to increase the efficiency of nutrients.

### Fruit Weight per Plot

Observation data on fruit weight per plot use fish waste and chicken manure according to Duncan's method can be seen in table 4.

**Table 4.** The average of Fruit Weight Per Plot use Fish Waste POC and Chicken Manure.

Treatment	Chicken Manure			Average
	K <sub>1</sub>	K <sub>2</sub>	K <sub>3</sub>	
POC				
	.....(kg).....			
P <sub>1</sub>	6,86	7,07	7,22	7,05
P <sub>2</sub>	6,96	7,04	7,12	7,04
P <sub>3</sub>	6,97	7,08	7,36	7,14
Average	6,93 c	7,06 b	7,23 a	7,07

Note: Numbers followed by unequal letters in the same row are significantly different according to the 5% DMRT Test. Based on table 4, fruit weight per plot for chicken manure treatment had a significant effect on fruit weight per plot of pumpkin with the highest average in K<sub>3</sub> treatment, 7.23 kg and the lowest average in K<sub>1</sub> treatment was 5.10 kg. It is assumed that the application of chicken manure at a dose of 2.25 kg/plot produces larger fruit diameter. The K element in chicken manure is important to fruit formation because the function of K is to influence the composition and translocate carbohydrates in plant body. According to Wijiyanti and Raden (2019) the function of potassium fertilizer is to influence the composition and translocation of carbohydrates in plant body, accelerating nitrogen metabolism and preventing flowers and fruit from falling. Suwanti et al (2017) added that potassium is macronutrient that plants need in large quantities. Potassium can help the process of plant photosynthesis. Potassium deficiency can reduce the rate of photosynthesis, plant growth and fruit weight. Furthermore, the treatment of fish waste POC had no significant effect on the parameters of fruit weight per plot due to K nutrient was low in fish waste POC. According to Hastuti et al (2018) the supply of phosphorus in plant organs increase metabolism in plants, especially in fruit filling process and fruit weight.

## IV. CONCLUSION AND SUGGESTION

### Conclusion

1. Fish waste POC did not significantly affect on the growth parameters and production pumpkin.
2. Chicken manure has a significant effect on growth parameters and pumpkin production.
3. The combination of both treatments did not significantly effect on growth parameters and pumpkin production.
4. The best dose in K<sub>3</sub> treatment, leaf area 153.48 cm<sup>2</sup>, fruit length 21.48 cm, fruit diameter 7.86 cm and fruit weight per plot 7.23 kg.

### Suggestion

As an organic material, chicken waste can help the growth and yield of pumpkin, therefore it is important to do research in different places to get more extensive information on the pumpkin development with high economic value.

### REFERENCES

- [1] Afriani, A., Heviyanti, M., & syawal Harahap, F. 2019. Effectiveness of gliocladium virens in controlling Fusarium oxysporum F. sp. capsici disease on chilli plant. *Jurnal Pertanian Tropik*, 6(3), 403-411.
- [2] Andrians, D. D., Syekhfani dan Yulia N. 2015. Pengaruh *Aspergillus niger* dan Pupuk Kandang Ayam Broiler terhadap Ketersediaan dan Serapan P serta Pertumbuhan Jagung pada Andisol Cangar. *Jurnal Tanah dan Sumber daya Lahan* Vol 2 No 1 : 163-169.
- [3] Asadi, 2013. Pemuliaan Mutasi untuk Perbaikan terhadap Umur dan Produktivitas pada Kedelai. *Jurnal Agrobiogen*. Vol. 9. No. 3.
- [4] Atmaja, I. S. 2017. Pengaruh Uji Minus One Test pada Pertumbuhan Vegetatif Tanaman Mentimun. *Jurnal Logika*. Vol. XIX. No. 1. ISSN : 2442-5176.
- [5] Elvina, S., Zozy, A. N. dan Suwirnen. 2018. Pengaruh Pupuk N dan Cekaman Kekeringan terhadap Pertumbuhan dan Kandungan Artemisinin Tanaman *Artemisia vulgaris L.* *Jurnal Biologi Universitas Andalas*. Vol. 6. No. 2. ISSN : 2303-2162.
- [6] Imani, F. L. dan Mudji S. 2019. Pengaruh Perbedaan Media Tanam dan Konsentrasi Aplikasi PGPR pada Pertumbuhan dan Hasil Tanaman Labu Madu (*Cucurbita moschata*). *Jurnal Produksi Tanaman* Vol. 7 No. 10. ISSN : 2527-8452.
- [7] Efendi, D. T., Endro S. dan Winardi D. N. 2016. Studi Pemanfaatan Limbah Fleshing Ikan Menjadi Kompos dengan Menggunakan Ulut Kandang. *Jurnal Teknik Lingkungan*, Vol 5, No 2.
- [8] Kurniati, F. Ida, H. dan Tedi, H. 2018. Respon Labu Madu (*Cucurbita moschata*) Terhadap Zat Pengatur Tumbuh Alami Dengan Berbagai Dosis Agrotech Res J. Vol 2. No 1. ISSN : 2614-7416.
- [9] Liferdi, L. 2010. Efek Pemberian Fosfor terhadap Pertumbuhan dan Status Hara pada Bibit Manggis. *Jurnal Hortikultura*. Vol, 20. No. 1.
- [10] Maharani, A. Suwirnen dan Zozy, A. N. 2018. Pengaruh Konsentrasi Giberelin (GA3) terhadap Pertumbuhan Kailan (*Brassica oleracea L.*) pada Berbagai Media Tanam dengan Hidroponik Wick system. *Jurnal Biologi Universitas Andalas*. Vol. 6. No. 2. ISSN : 2303-2162.
- [11] Munawar, A. 2011. Kesuburan Tanah dan Nutrisi Pemupukan Bagi Tanaman. IPB Press. Bogor.
- [12] Nurahmi, E., Hasinah dan Sri, M. 2010. Pertumbuhan dan Hasil Labu Kuning Akibat Pemberian Pupuk Organik Cair NASA. Program Studi Agroekoteknologi, Fakultas Pertanian Universitas Syiah Kuala, Banda Aceh. *J. Agrista* Vol. 14 No. 1.
- [13] Pasta, I., Andi, E. dan Henry, N. B. 2015. Tanggap Pertumbuhan dan Hasil Tanaman Jagung Manis (*Zea mays L.*) pada Aplikasi Berbagai Pupuk Organik. *Jurnal Agrotekbis*. Vol. 3. No. 2. ISSN : 2338 - 3011.
- [14] Rohmiyati, S. M. 2010. Diktat Kuliah Dasar-Dasar Ilmu Tanah. Fakultas Pertanian INSTIPER. Yogyakarta.
- [15] Royadi, D., Hartati, R. M. dan Pauliz, B. 2017. Pengaruh Berbagai Dosis Pupuk N dan P terhadap Nodulasi dan Pertumbuhan *Mucuna bracteata*. *Jurnal Agromast*, Vol. 2. No. 2.
- [16] Safuan, L. O. 2007. Penyusunan Rekomendasi Pemupukan N, P dan K pada Tanaman Nenas (*Ananas comosus L.*) berdasarkan Status Hara Tanah. Institut Pertanian Bogor. Bogor.
- [17] Suartini, K., Paulus H. A. dan Minarni R. J. 2018. Pembuatan Pupuk Organik Cair Dari Limbah Jeroan Ikan Cakalang (*Katsuwonus pelamis*). *J. Akademika Kim*. 7(2) : 70-74. ISSN 2302-6030.
- [18] Sukmawati, Subaedah dan Sudirman, N. 2018. Pengaruh Pemangkasan terhadap Pertumbuhan dan Hasil Tanaman Cabai Merah (*Capsicum annum L.*). *Jurnal Agrotek*. Vol. 2. No. 1.
- [19] Suwanti, J. Susilo, M. dan Wicaksono, K. 2017. Respon Pembungaan dan Hasil Tanaman Nanas (*Ananas comosus L.*) cv. Smooth Cayenne terhadap Pengurangan Pemupukan dan Aplikasi Etilen. *Jurnal Produksi Tanaman*. Vol. 5. No. 8. ISSN : 1346-1355.
- [20] Zubaidah, Y. dan Rafli, M. 2007. Aktifitas Pemupukan Fosfor (P) pada Lahan Sawah dengan Kandungan P Sedang. *Jurnal Solum*. Vol. 4. No. 1. ISSN : 1829-7994.