



SHORT COMMUNICATION

Fast Method for Organic-NPK Preparation

Yasser El-Nahhal^{1*} Ibrahim El-Nahhal²

¹Dept of Earth and Environmental Science Faculty of Science, The Islamic University-Gaza, Palestine.

²Université de Toulon - CS 60584, France.

Abstract

Mineral NPK fertilizer pose threats to ground water aquifer, soil microorganisms and human health. Several attempts have been made to replace it by organic fertilizers but most of them did completely succeeded. Here below in this short communication we described detailed process how to produce organic NPK fertilizer. Practical investigations showed promising results. We strongly, recommend the use of this method to replace mineral NPK fertilizer.

Keywords: organic-NPK , NPK, organic NPK

Citation: El-Nahhal Y.; El-Nahhal I. Fast Method for Organic-NPK Preparation. "A shoert communication" *Jordanian Journal of Engineering and Chemical Industries*, Vol.8, No.3, pp:259-262 (2025).

1. Process description

Mineral NPK referees to nitrogen N, phosphorus P, and potassium K, fertilizers. These elements are macronutrients that plants need and responsible on proper plant growth and production. The absence of any of them will result in disturbed plant growth. Plants need these elements in large quantities during the life cycle, accordingly there were called macronutrient. So far, NPK fertilizers are now prepared as inorganic fertilizers and widely used over the world. The use of these fertilizers may create problems to soil fertility, plant growth and ground water. Accordingly, there is a growing effort all over the world to find suitable alternatives to them. Several alternatives have been investigated. This includes composting garden waste (Khalib et al., 2018) , the use of animal manures, vermicompost production (Doan et al. 2015; Goswami et al., 2017), preparation of fish fertilizers (Chalamaiah et al., 2012) , and using sludge and waste water (El-Nahhal et al., 2017, Hammad et al., 2018; Qrenawi et al., 2022). All these alternatives are solid materials except fish fertilizer. So far, the benefits of these fertilizers to plants requires the application two months in advance because these materials should be in a liquid form so that plants can absorb them. Noteworthy, the use of those fertilizers cannot give the required effects. Accordingly, we here below provide a fast method for suitable organic NPK production for direct plant application during the life cycle. The method as shown in **Figure 1** based on collecting ten kg leaves from a leafy plant such as celery, radish, cauliflower, spinach, onions and allium, 10 kg of fruits from vegetables and 10 kg fish. These materials are grounded separately and mixed to gather with an equal amount of chlorine free water. Additionally, 10 kg of vegetables plant seeds are grounded and added to the mixture. The mixture was heated for 4-5 hours until nearly half of the used water evaporated. Then, the system was left to cooling down to the room temperature. The liquid phase was collected by filtration and kept in 2 plastic container containing 3 kg brown sugar and one kg of fresh soil collected from the biological soil crust (El-Nahhal et al., 2018), and 0.1 kg of sea salts. The system is left for 5-7 days in plastic container covered by a cheese cloth and kept in the shade on the atmospheric temperature for fermentation period. Then, end of fermentation period (sweet sour smell), the solution is filtered by a sieve of 0.2 mm mesh size and diluted to total volume of 100 L by distilled water.

* Corresponding author: E-mail: y_el_nahhal@hotmail.com

Received 3-11 2025

Revised: 10-11- 2025

ORCID: <https://orcid.org/0000-0002-4806-0016>

Accepted: 15-11- 2025

Jordanian Journal of Engineering and Chemical Industries (JJECI), Vol.8, No.3, 2025, pp: 259-262



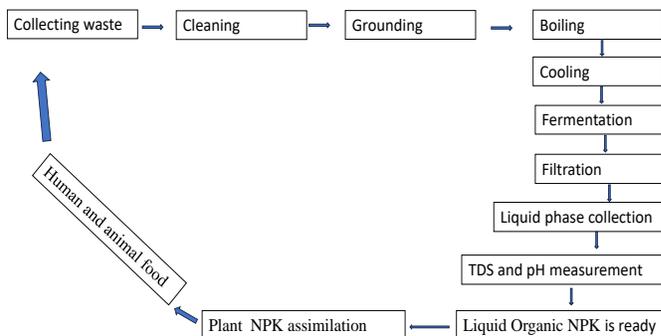


Fig. 1. A block diagram that shows the subsequent step in the fast process applies to produce organic NPK.

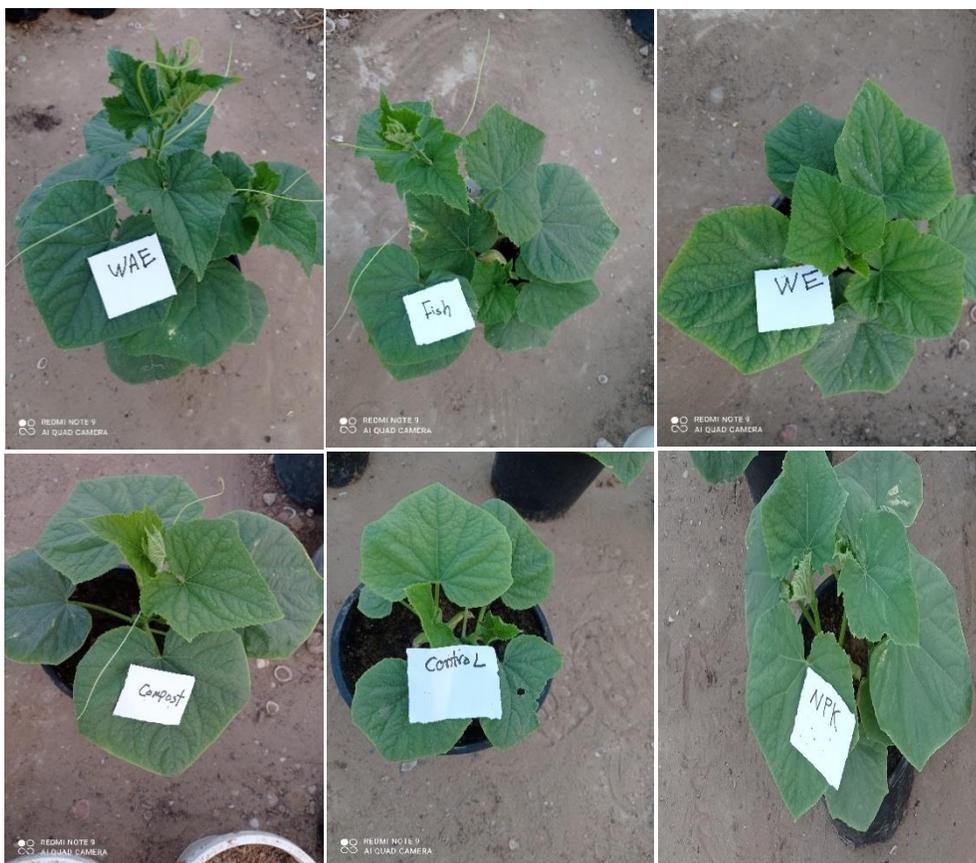


Fig. 2. Effect of organic fertilizer on cucumber growth. The white Padge indicates the tested fertilizer produced by this method. WAE (wood ash extract), Fish, WE (weed extract), compost, control and balanced NPK. Balance NPK (e.g. NPK 20-20-20) means that the percentage of the 3 elements are equal.

It can be seen that growth parameters such as plant size, number of leaves, surface area of leaves, intensity of green color, and plant height are quite different among each other. It is obvious that the control sample is the smallest one whereas the treated plant with fish, WAE, WE fertilizers were better than the control sample and the NPK treatment. However, fish fertilizer treatment is the best among all, indication that fish fertilizer is a promising organic fertilizer. An interesting outcome of this work is that organic fertilizers (liquid organic NPK) was better than mineral NPK fertilizer.

Additionally, in **Table 1**, we presented chemical parameters of analyzed NPK samples. Results show high N% content (11.55%) of one sample and high K₂O content (11.48) of another one. These differences are due to different used wastes to produce the organic NPK fertilizers. One of them contains high percentage of N 11.55% and less than 1% of P₂O₅ and K₂O. So far, the high N% content is used in the vegetation growth stage whereas, high K₂O is used for fruiting stage.

Table 1. chemical parameters of analyzed NPK samples

Chemical parameters	Organic NPK with high N%	Organic NPK with high K ₂ O%
N%	11.500	0.030
P ₂ O	0.370	4.150
K ₂ O	0.710	11.480
Density g/Cm ³	1.230	1.184

2. Concluding remarks

The method used to produce liquid organic fertilizer is effective and provides good results. The interesting outcome of the method that fish fertilizer and wood ash extract provide plant growth better than the widely used NPK mineral fertilizer. It is evident from **Figure 2** that plant growth parameters are quit better than the traditional NPK fertilizers. This is also in agreement with the laboratory results. The advantage of the method is that it is easy and cost effective whereas the disadvantage of the method is that the raw materials that are necessary for the fertilizer production may not be found regularly in the market. However, we strongly recommend the use this method to produce organic fertilizer for better agricultural quality, safe ground water quality, healthy soil and safe environment.

Author contribution Statement

El-Nahhal, Y. proposed the conceptual frame work of the project, planed the experimental work and wrote the 1st draft of the manuscript.

El-Nahhal, I. made the chemical analysis of the organic fertilizer and edit the final version of the manuscript.

Declaration statements

Funding

We acknowledge the funds from Alexander von Humboldt foundation for (partial funds).

Conflict of interest:

The authors declare no competing interests.

References

- Chalamaiah M., Dineshkumar B., Hemalatha R., & Jyothirmayi T. (2012) Fish protein hydrolysates: Proximate composition, amino acid composition, antioxidant activities and applications: A review. *Food Chemistry*, 135, pp. 3020–3038. <http://dx.doi.org/10.1016/j.foodchem.2012.06.100>
- Doan TT, Rumpel C, Janeau J-L, Jouquet P., & Henry-Des-Tureaux T. (2015). Impact of compost, vermicompost and biochar on soil fertility, maize yield and soil erosion in Northern Vietnam: A three year mesocosm experiment. *Science of the Total Environment*, 514, pp. 147-154.
- El-Nahhal Y, El-Dahdouh O., & Anajjar H. (2017). Influence of sand filter in wastewater treatment (a case study in Gaza City, Gaza Strip wastewater treatment plant). *Desalination and Water Treatment*, 89, pp. 118-126. <https://doi.org/10.5004/dwt.2017.21398>.
- Goswami L, Nath A, Sutradhar S, Bhattacharya SS, Kalamdhad A., & Vellingiri K. (2017). Application of drum compost and vermicompost to improve soil health, growth, and yield parameters for tomato and cabbage plants. *Journal of Environmental Management*, 200, pp. 243-252. DOI: 10.1016/j.jenvman.2017.05.073. 6
- Hammad E., Al-Agha M., & El-Nahhal Y. (2018). Enhancing Biogas Production: Influence of Mixing Cow and Chicken Manures. *Energy and Power Engineering*, 10 (8), pp: 383-397. <https://doi.org/10.4236/epe.2018.108024>.

- Khalib S., Irnis A., & Tengku N. (2018). Composting of Garden Waste using Microorganisms (IMO) as Organic Additive Indigenous. *International Journal of Integrated Engineering: Special Issue. Innovations in Civil Engineering*, 10(9), pp. 140-145. DOI: <https://doi.org/10.30880/ijie.2018.10.09.026>.
- Qrenawi, E. , EL-Nahhal, I. , Al-Agha, M. & El-Nahhal, Y. (2022). Rapid Method for Greywater Treatment and Their Potential Reuse in Agriculture. *American Journal of Analytical Chemistry*, 13, pp. 20-38. doi; [10.4236/ajac.2022.132003](https://doi.org/10.4236/ajac.2022.132003)