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MINERAL ANALYSIS OF PHOSPHATE ROCK AS IRAQI RAW FERTILIZER

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Abstract
This paper was assessed the mineral elements level (Co, Pb, Cr, Fe, Ni, Cu, Zn, Cd and Mn) in raw phosphate rock (PRock) that obtained from State Company For Phosphate in Anbar province. This work was achieved to add new data of microelements toward this raw local fertilizer. PRock become important as natural fertilizer to plant and mushroom due to many trace minerals.
Key words: Mineral Elements Level, Raw Fertilizer, Rock Phosphate.

Introduction

Phosphate rock was used to provide a source of phosphorus, a major component of natural phosphate rock (Leggo et al., 2009) to improve plant and mushroom growth. In Ireland, available biodegradable wastes, pig waste solids (20% w/w), poultry litter (26% w/w), spent mushroom compost (26% w/w), cocoa husks (18% w/w) and moistened shredded paper (10% w/w) were supplemented using phosphate rock as an suited organo-mineral fertilizers (by-products phosphogypsum) for the grasslands (Rao et al., 2007).

The role of rock-phosphate-solubilizing microorganisms appears in some bacteria and fungi. Bio-fertilizer of *Bacillus subtilis* (Al-Tae'e, 2008), *Aspergills niger*, *Bacillus pumilus* (Abed et al., 2013), *Pseudomonas fluorescence* (Al-Tae'e, 2008; Abed et al., 2013) and *Actinomycetes* (Faraj, 2014) were used to increase phosphate rock solubility after blended it with organic matter wastes that increased phosphate potential as phosphor source. Also, raw phosphate rock was used to raise the yield of edible mushrooms such *Pleurotus* spp. (Al-Issawy, 2011; Owaid, 2013, Owaid et al., 2015) and *Agaricus bisporus* (Abed and Rasheed, 2013) which used as local available raw fertilizer in Iraq.

In Iraq, raw phosphate rock found in State Company For Phosphate in Anbar province was analyzed in this achievement. That is achieved to add new data in mineral value of Iraqi raw phosphate rock.

Materials and Methods

Sampling

The raw phosphate rock is obtained from State Company For Phosphate in Anbar province.

Reagents

All reagents were of analytical reagent grade unless otherwise stated. Double deionized water was used for all dilutions. HCl, HNO_3 (65%) and H_2O_2 (30%) were of quality (E. Merck). All the plastic and glassware were cleaned by soaking in diluted HNO_3 and were rinsed with distilled water prior to use. The element standard solutions used for calibration were prepared by diluting a stock solution of 1000 mg L^{-1} (Co, Pb, Cr, Fe, Ni, Cu, Zn, Cd and Mn) supplied by Sigma.

Apparatus

Phoenix-986 (USA) atomic absorption spectrometer with deuterium background corrector was used in this study. Co, Pb, Cr, Fe, Ni, Cu, Zn, Cd and Mn in PRock powder samples were carried out in an air/acetylene flame.

Microwave digestion

One gram of phosphate rock powder was placed in a beaker (100 ml capacity) and digested with 10 ml of mixture (HNO_3:H_2O_2:HCl) at ratio (2:2:3) in microwave digestion system for 10 min with 800 W and diluted to 25 ml with deionized water. A blank digest was carried out in the same way. All sample solutions were clear.

Results and Discussion

In this study, the chemical value of phosphate rock (PRock) showed in Table 1. The mineral Fe outreach to 59.33 g kg^{-1} followed by Cr and Zn at levels 17.4 g kg^{-1} and 10.68 g kg^{-1} respectively. Values of other trace minerals reached to 2.6 g kg^{-1}, 1.42 g kg^{-1} and 1.21 g kg^{-1} for Ni, Co and Cu, respectively. Others trace minerals had low levels compared with the results above, Cd, Mn and Pb at levels 0.77 g kg^{-1}, 0.6 g kg^{-1} and 0.41 g kg^{-1} respectively.

This raw phosphate rock (PRock) in this experiment was analyzed by the source (State Company For Phosphate) as mentioned Abed et al. (2013), which include 302 g kg^{-1} CaCO3, 23.8 g kg^{-1} SiO2, 15.2 g kg^{-1} sulfur, 3.2 g kg^{-1} fluorine, 88.6 g kg^{-1} phosphor and 14.6 g kg^{-1} Fe. These levels raised chemical value of PRock as a good source for phosphorus and trace elements. It is important for plant and mushroom requirements of growth. According to its chemical value, it can be used as a nature fertilizer. PRock is one of the raw fertilizers for plant and mushroom directly in media or after dissolved it using bacterial or fungal inoculation as bio-fertilizer.

Table 1: Chemical analysis of raw phosphate rock (PRock) from Anbar soil (g kg^{-1})

Co	Pb	Cr	Fe	Ni	Cu	Zn	Cd	Mn
1.42	0.41	17.40	59.33	2.60	1.21	10.68	0.77	0.60

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References

Abed, I.A. and Rasheed, H.M., 2013. Utilization of sesaban for preparation of substrate to develop two strains of *Agaricus bisporus*. *Al-Anbar Journal of Agricultural Sciences*, 11(2), 139-149.

Abed, I.A., Salih, H.M. and Aljoboory, W.M., 2013. Preparation of bio-organic fertilizer from some mineral and organic wastes. *Al-Anbar Journal of Agricultural Sciences*, 11(2), 128-139.

Al-Issawy, K.J.F., 2011. Improve the local components of the substrate to increase the production Oyster mushroom *Pleurotus ostreatus*. Thesis, College of Agriculture, University of Anbar, Iraq. pp. 84.

Al-Tae'e, R.A., 2008. Role of phosphate solubilization bacteria on phosphate solubility in soil. *Mesopotamia Journal of Agriculture*, 36(4), 67-75.

Faraj, H.A., 2014. Effect of bio-fertilizer with phosphate Solubilizing *Actinomycetes* on the growth of wheat. *Al-Anbar Journal of Agricultural Sciences*, 12(2), 50-62.

Leggo, P.J. and Ledesert, B., 2009. Organo-Zeolitic-Soil Systems: A New Approach to Plant Nutrition. In: Fertilizers: Properties, Applications and Effects. Ed. L.R. Elsworth and W.O. Paley. Nova Science Publishers, Inc. New York. pp. 223-239.

Owaid, M.N., 2013. Testing efficiency of different agriculture media in growth and production of four species of oyster mushroom *Pleurotus* and evaluation the bioactivity of tested species. Ph.D. thesis. Dep. Biology, College of Science, University of Anbar, Iraq. 169 pp. doi:10.13140/2.1.4422.6883

Owaid, M.N., Abed, I.A. and Al-Saeedi, S.S. (2015). Using of date palm fiber mixed with other lignocelluloses toward *Pleurotus ostreatus* (Higher Basidiomycetes) crop. *Emirates Journal of Food and Agriculture*, (online: 9 April 2015). doi:10.9755/ejfa.184440.

Rao, J.R., Watabe, M., Stewart, T.A., Millar, B.C., Moore, J.E., 2007. Pelleted organo-mineral fertilisers from composted pig slurry solids, animal wastes and spent mushroom compost for amenity grasslands. *Waste Manag*., 27(9), 1117-1128.