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1. Alexander, R. 1999. Compost markets grow with environmental application. *Biocycle*, 4: 43-48.
2. Almendro-Candel, M.B., J. Navarro-Pedreño, I. Gómez Lucas, M.M. Jordán Vidal, E. García-Sánchez and J. Mataix-Solera. 2002. Movement of Fe, Mn, Cu and Zn in a sewage sludge treated soil. In: D. Almorza, C.A. Brebbia, D. Sale and V. Popov. (Edits). *Waste Management and the Environment*, WIT Press, Southampton, pp. 311-320.
3. Arancon, N.Q., C.A. Edwards, P. Bierman, C. Welch and J.D. Metzger. 2004. Influences of vermicomposts on field strawberries and effects on growth and yields. *Bioresource Technology*. 93: 145-153.
4. Baldoni, G. 1996. The influence of compost and sewage sludge on agriculture crops In: De Bertoldi et al. (Edits). *The Science of Composting*. Blackie Press, London. pp: 430-438.
5. Davari Nejhad, GH., GH. Haghnia and A. Lakzian. 2003. Effects of Farmyard Manure and Enriched Compost on wheat Yield (*Triticum aestivum*) *J. Agri. Sci. Indust.*, 18(1): 100-108.
6. Egli, D.B. 1993. Cultivar maturity and potential yield of soybean. *Field Crops Res.* 32: 147-158.
7. Erhart, E., W. Hartl and B. Putz. 2005. Biowaste compost affects yield, nitrogen supply during the vegetation period and crop quality of Agricultural crops. *European Journal of Agronomy*, 23(3): 305-314.
8. Espinoza, L.A. 1997. Fate of nitrogen and metals following organic waste applications to some Florida soils. Flórida: Tese (Doutorado), University of Florida. 73 p.
9. Federick J.R. and J.D. Hesketh. 1994. Genetic improvement in soybean: physiological attributes. In: G.A. Slater, Editor, *Genetic Improvement of Field Crops*, Marcel Dekker, New York, pp: 237-286.
10. Frankenberger, J. and W.T.M. Arshad. 1995. *Phytohormones in Soils: Microbial Production and Function*. Marcel and Deckker, New York. 503 p.
11. Herbert J.S. and G.V. Litchfield. 1982. Partitioning soybean yield components. *Crop Sci.*, 22: 1074-1079.
12. Hue, N.V., J.A. Silva and R. Arifin. 1988. Sewage sludge-soil interactions as measured by plant and soil chemical composition, *Journal of Environmental Quality*, 17: 384-390.
13. Keeney, D.R. 1987. Nitrate in groundwater-agricultural contribution and control. In: *Proceedings of the Conference on Agricultural Impacts on Ground Water*, Omaha, NE, 11-13 August 1986. National Water Well Association, Dublin, OH. pp. 329-351.
14. Magdoff, F. and R.R. Weil. 2004. *Soil Organic Matter in Sustainable Agriculture*. CRC Press, Boca Raton. 398 p.
15. Mehmet, Y., D. Kaydan and Ö. Arvas. 2005. Effects of Sewage Biosolid Application on Seed Protein Ratios, Seed N P Contents, Some Morphological and Yield Characters in Lentil (*Lens culinaris Medic.*). *Research Journal of Agricluture and Biological Sciences*. 1(4): 308-314.
16. Navarro-Pedreño, J., M.B. Almendro-Candel, M.M. Jordán-Vidal, J. Mataix-Solera and E. García-Sánchez. 2004. Risk areas in the application of sewage sludge on degraded

- soils in Alicante province (Spain). In: J.F. Martin, C.A. Brebbia, A.E. Godfrey and J.R. Díaz de Terán, (Edits). *Geo-Environment*, WIT Press, Southampton, pp. 293-302.
17. Pereira Neto, J.T. 1994. Minimização de resíduos sólidos: reciclagem/coleta seletiva e compostagem. In: *Simpósio Internacional de Destinação de Lixo*, Salvador. Salvador: CONDER. pp. 80-269.
 18. Rees, R.M., B.C. Ball, C.A. Watson and C.D. Campbell. 2001. *Sustainable Management of Soil Organic Matter*. CAB International, Oxfordshire, UK, 464 p.
 19. Robin, A., R. A.K. Szmidt and W. Dickson. 2001. Use of compost in agriculture, Frequently Asked Questions (FAQs). *Remade Scotland*. pp. 324-336.
 20. Rodrigues, M., J. Lopez-Real and H. Lee. 1996. Use of compost societal organic wastes for sustainable crop production. In: M. De Bertoldi, P. Sequi, B. Lemmes and T. Papi, (Edits). *The Science of Composting*, Blackie Academic and Professional, London. pp. 447-456.
 21. Senesi, N., G. Brunetti and C. Plaza. 2005. Quality of organic amendment and effects on soil organic matter, with special emphasis on humic substances: a review of general aspects and most recent findings of the Bari group. In: Yang, J.E., Sa, T.M., Kim, J.J. (Eds.), *Application of the Emerging Soil Researches to the Conservation of Agricultural Ecosystems*. Korean Society of Soil Science and Fertilizer, Korean Society of Agriculture and Environment, Rural Development Administration, Seoul, Korea. pp. 95-129.
 22. Shimada, S. Shimada, M. Kokubun, H. Shibata and S. Matsui. 1992. Effect of water-supply and defoliation on photosynthesis, transpiration and yield of soybean. *Jpn. J. Crop Sci.*, 61(2): 264-270.
 23. Specht, J.E. Specht, J.H. Williams and C.J. Weidenbenner. 1986. Differential responses of soybean genotypes subjected to a seasonal soil water gradient. *Crop Sci.*, 26: 922-934.
 24. Stratton, M.L. Barker and A. Regsdale. 2000. Sheet composting overpowers weed in restoration project. *Biocycle*, 4: 57-59.
 25. Voldeng, H.D. Voldeng, E.R. Cober, D.J. Hume, C. Gillard and M.J. Morrison. 1997. Fifty-eight years of genetic improvement of short-season soybean cultivars in Canada, *Crop Sci.*, 37: 428-431.
 26. Zhang, M., D. Heaney, E. Solberg and B. Heriquez. 2000. The effect of Municipal Solid Waste compost on metal uptake and yield of wheat, barley and canola in less productive farming soils of Alberta. *Compost Science Utilization*, 8(3): 224-235.

Response of Soybean Cultivars to Application of Organic and Chemical Fertilizers

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Abstract

In order to investigate the effect of different organic fertilizers amounts (municipal compost, vermicompost and sewage sludge) on yield and yield components of different soybean cultivars, an experiment was conducted in 2006 at Sari Higher Education Complex of Agricultural Sciences and Natural Resources. A split plot experiment based on randomized complete block design with three replications was used. Main plots were included 8 fertilizer treatments consisted of two rates (20 and 40 ton ha⁻¹) of municipal compost, vermicompost and sewage sludge, chemical fertilizer treatment (the 75 kg ha⁻¹ of potassium sulphate and ammonium phosphate) and control or without organic or chemical fertilizer. Sub plots consisted of three genotypes of soybean (032, 033 and JK). Maximum grain yield was recorded in levels of 20 and 40 ton ha⁻¹ sewage sludge, 40 ton ha⁻¹ municipal compost and chemical fertilizer. Different soybean cultivars had significant differences in terms of yield and yield components. Among different cultivars maximum grain yield were produced in JK and 033 cultivars. The result of mean comparisons showed that interaction effects of fertilizer and cultivar were significant for biomass, harvest index, 1000 seed weight, number of pod per plant and number of seed per pod. The highest pod number per plant was belonged to JK and 033 genotypes in 40 ton per hectare sewage sludge and vermicompost treatments, respectively. Among different mentioned traits, all of them except 1000 seed weight had a positive and significant correlation with grain yield. Over all, it seems that disposal of organic waste on agricultural lands could be considered as one of the suitable and practicable environmental option and optimization manure using in our country.

Keywords: Soybean, Yield, Municipal compost, Vermicompost, Sludge

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