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VERMICOMPOSTING FROM MUNICIPAL SOLID WASTE

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**Abstract:** Growing urbanization and industrialization have led to generation of large quantities of wastes. Major portion of Municipal Solid Waste is dumped in landfill sites without any pretreatment, which further creates the organic load on the ground water, and more emissions of landfill gases. The best possible option to reduce the potential pollutants before entering the natural biological system is to pretreated it prior to its final disposal. Here, an out door study was under taken to pretreat the Municipal Solid Waste collected from a vegetable market on a pilot scale by windrow composting and vermicomposting. The raw waste was put to active composting without any source separation and pulverization. Pretreatment indicators were developed and are used as a tool to measure the stabilization of the waste under different conditions, periodically. It was investigated that the volatile solid content of the waste reduced from 86 % to 60 % within two weeks of active windrow composting. The volatile solid content in the vermicomposted waste was also reduced by 19%. The degradation of organic matter was greatest within the first week of active composting with an average pile temperature of 550C. Furthermore, by adding proper amount of sludge from waste water treatment plant to the raw waste, resulted to a greater breakdown of organic residues, which ultimately resulted in a lowering of C/N ratio from 43 to 24 within one week.

**Keywords:** Use the word “Keywords” as the title, in 10-point Times New Roman, boldface type, initially capitalized. The keywords are to be in 10-point, single-spaced type, and comma should be used between the keywords. (e.g. Power converters, Switched capacitor circuits, Integrated circuits.) Another horizontal line should be under the keywords. Leave one blank line after the line, and then begin the introduction.

1. **Introduction**

Vermicomposting is the conversion of biodegradable refuse into a high quality bio-fertilizer with the aid of Earthworms. Whereas, the composting is the other mode round where the organic part of the refuse is consumed by a series of successive bacteria according to the heat of the system. Earthworms have from time immemorial played a key role in soil biology by serving as handy natural bioreactors to harness and destroy soil pathogens, thus converting organic wastes into valuable bio-fertilizers, enzymes, growth hormones and proteinaceous worm biomass. The worms do it by feeding rapaciously on all biodegradable refuse such as leaves, paper (non-aromatic), kitchen waste, vegetable refuse.

1. **Formatting your paper**

All printed material, including text, illustrations, and charts, must be kept within a print area of 17.2 cm wide by 24.62 cm high. For A4 paper, all the pages should begin 2.54 cm from both the top and the bottom edge, and 1.9 cm both from the left and the right edge. The page header is expected to be 1.5 cm high, and the page footer should be height of 1.75 cm. Do not write or print anything outside the print area. All text must be in a two-column format. Columns are to be 22.2 times of the character size, with a space size of 2.02 times of the character size. Text must be fully justified.

 A format sheet with the margins and placement guides is available as both Word and PDF files as <format.docx> and <format.pdf>. It contains lines and boxes showing the margins and print areas. If you hold it and your printed page up to the light, you can easily check your margins to see if your print area fits within the space allowed.

1. **Main title**

The main title (on the first page) should begin under the figure at the top of the page, centered, and in Times New Roman 14-point, boldface type. Capitalize the first letter of nouns, pronouns, verbs, adjectives, and adverbs; do not capitalize articles, coordinate conjunctions, or prepositions (unless the title begins with such a word). Leave a 10.5-point line before and a 14-point line behind the main title.

1. **Author name(s) and affiliation(s)**

Author names are to be centered beneath the title and printed in Times New Roman 11-point, boldface type. Author affiliations should be centered beneath author names and printed in Times New Roman 11-point, non-boldface type. Multiple authors may be shown in a two- or three- column format, with their affiliations italicized and centered below their respective names. Include addresses and the post code if possible. The corresponding author’s email address should be centered in Times New Roman 10.5-point as shown here.



(a)



(b)

Figure.1 System model: (a) top figureand (b) bottom figure

Table 1. Definition of terms

|  |  |
| --- | --- |
| **Immune system** | **Vehicle detection system** |
| Antigen | Pre-processed vehicle objects |

\* In Table, the font size is 10pt.

1. **Type-style and fonts**

Wherever Times is specified, Times Roman of Times New Roman may be used. If neither is available on your word processor, please use the font closest in appearance to Times. Avoid using bit-mapped fonts if possible. True-Type 1 fonts are preferred.

1. **Main text**

Type your main text in 11-point Times New Roman, single-spaced. Do not use double-spacing. All paragraphs should be indented 1.5 times character size. Be sure your text if fully justified—that is, flush left and flush right. Please do not place any additional blank lines between paragraphs.

1. **First-order headings**

For example, “1. Introduction”, should be Times New Roman 12-point, boldface, initially capitalized, flush left. Use a period (“.”) after the heading number, not a colon.

As in this heading, they should be Times New Roman 11-point boldface, initially capitalized, flush left.

Third-order headings, as in this paragraph, are discouraged. However, if you must use them, use 11-point Times New Roman, boldface, initially capitalized, flush left.

1. **Footnotes**

Use footnotes sparingly (or not at all) and place them at the bottom of the column on the page on which they are referenced. Use Times New Roman 9-point type, single-spaced. To help your readers, avoid using footnotes altogether and include necessary peripheral observations in the text (within parentheses, if you prefer, as in this sentence).

1. **Figures and tables**

Figures (refer with: Fig. 1, Fig. 2, ...) and Tables (refer with: Table 1, Table 2, …) should be presented as part of the text, leaving enough space so that the caption will not be confused with the text.

Callouts, figure and table captions should be 10-point non boldface Times New Roman. Initially capitalize only the first word of each figure caption and table title. Figures and tables must be numbered separately. Figure captions are to be centered below the figures. Table titles are to be centered above the tables. For example: “Figure.1 Structure of RBFNN.”, “Table 1. Definition of terms”.Do not put borders around the outside of your figures.

1. **Equations**

Equations (refer with: Eq. (1), Eq. (2), ...) should be indented 5 mm. There should be one line of space above the equation and one line of space below it before the text continues. The equations have to be numbered sequentially, and the number put in parentheses at the right-hand edge of the text, such as (1), (2), etc. Do not use figures instead of equations.

Acknowledgments

Acknowledgments are to show that the article is supported by what organization. For example, “This work was supported by the National Nature Science Foundation under Grant No. 405”.

References

List and number all bibliographical references in 11-point Times New Roman at the end of your paper. (see the following example.)When you cite some references in sentences, please give numbers, such as [1].Two or more references at a time must be put in one set of brackets [2,4-5].The quotation must be started according to the reference number, such as [1], [2], …

1. R. Ruskone, S. Airault, and O. Jamet, “Vehicle Detection on Aerial Images”,*International Journal of Intelligent Engineering and Systems*, Vol.1, No.1, pp.123-456, 2009.

(In the case of Journal Papers)

1. R. Ruskone, L. Guigues, S. Airault, and O. Jamet, “Vehicle Detection on Aerial Images”,In: *Proc. of International Conf. On Pattern Recognition*, Vienna, Austria, pp.900-904, 1996.

(In the case of Conference Proceedings)

1. J. Serra, *Image Analysis and Mathematical Morphology*, Vol.2, Academic Press, New York, N.Y.1988.

(In the case of Book & Report)

\*Note: e.g. In the case of the author name:"John Doe", express as "J. Doe".

("John" is the first name and "Doe" is the family name.)