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Proposal on the use of compost based on market waste: a sustainable alternative
[Propuesta sobre el uso de compost a base de residuos de mercados: una alternativa sostenible]

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Resumen

El alza de los alimentos, disminución de puestos de trabajo han afectado el avance económico. Por este motivo, se investigó sobre aprovechamiento de los residuos de mercado para el beneficio de la comunidad. El objetivo fue determinar la cuantificación y caracterización química para el beneficio de la comunidad. Se basa en metodología descriptiva; puesto que se caracterizó y clasificó los residuos generados en el mercado el Milagro de Barranca y se elaboró una encuesta ¿Cuál es tu propuesta sobre el uso de compost a base de los residuos de mercado? Obtenidos los datos se procesaron mediante estadísticas básicas. Se determinó que por día produce residuos orgánicos con 65.00 %, inorgánico con 28.67 % y otros con 6.33 % y por mes orgánicos con 68.13 %, inorgánicos con 26.63 % y otros con 5.24 % del total de 10.341 tn/mes de agosto y composición química del compost tiene adecuada concentración de materia orgánica, bajo nitrógeno, fósforo, potasio, magnesio y alto pH 8.54. En propuesta del uso de compost resalta el 40 % para uso agrícola. Se concluye que, mediante la cateterización de los residuos se produce 65 % orgánicos y al elaborar el compost tiene concentración de nutrientes que son favorables para mejorar las propiedades del suelo y fortalecer la planta. Por lo tanto, el uso del compost es una alternativa sostenible para la agricultura.

Palabras clave: Residuos de mercado, características, compost y sostenible.

Abstract

The rise in food, decrease in jobs have affected economic progress. For this reason, research was carried out on the use of market waste for the benefit of the community. The objective was to determine the quantification and chemical characterization for the benefit of the community. It is based on descriptive methodology; Since the waste generated in the Miracle of Barranca market was characterized and classified, and a survey was prepared, what is your proposal on the use of compost based on market waste? Once the data was obtained, they were processed using basic statistics. It was determined that per day it produces organic waste with 65.00%, inorganic with 28.67% and others with 6.33%, and per month organic with 68.13%, inorganic with 26.63% and others with 5.24% of the total of 10,341 tons/month of August and chemical composition. of the compost has adequate concentration of organic matter, low nitrogen, phosphorus, potassium, magnesium and high pH 8.54. In the proposal for the use of compost, 40% stands out for agricultural use. It is concluded that through the catheterization of the waste,

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65% organic is produced and when making the compost it has a concentration of nutrients that are favorable to improve the properties of the soil and strengthen the plant. Therefore, the use of compost is a sustainable alternative for agriculture.

Keywords: Market waste, compost, sustainable and farmer.

1. Introduction

The overvaluation of fertilizers and energy have affected economic growth in Peru and added the pandemic has increased the cost of food, medicine and other basic products. Likewise, this year due to the geopolitical conflict between Russia and Ukraine, it is expected to become more acute due to what is perceived to be an unstable environment in the global economy. According to ECLAC, N.U. (2022), mentions that the region's economy recovered gradually as did international trade due to the pandemic; however, the conflict between Russia and Ukraine and the persistence of Covid-19 had a significant impact on energy and food prices.

This situation has promoted the opening of markets, shops, supply centers and labor informality that sell their products in the vicinity of these businesses. As a result of these activities, the accumulation of solid waste outside the businesses that serve as hosts for insects that are disease vectors and pollute the environment was noted. The analysis is supported by De La Torre R. et al. (2020), who conclude that the environmental problems in the Los Arenales Market are organic and inorganic waste from the consumption of plastic materials, fuels, domestic water emissions and others such as noise and electricity. Likewise, García R. et. to the. (2016), mention that the inadequate management of solid waste in the central market by the actors involved and the authorities themselves increases the problems of environmental pollution, specifically in the contamination of water, air, soil, and the spread of diseases.

Due to this social problem, it is necessary to propose viable alternatives with a sustainable approach, in such a way that market waste is used on a scale; Therefore, it is required to characterize, quantify and develop adequate proposals on the management of market waste in order to favor the community and at the same time reduce environmental pollution. In accordance with the aforementioned, Swisscontact (2016) indicates that in each corner, 3 containers should be placed for buyers and/or visitors to the market, according to the type of solid waste. Likewise, for placement, you must take into account the width of the traffic lane for vehicles, pedestrians, influx of buyers, sellers and others.

In this context, it is necessary to develop proposals for the use of market waste, transforming it into an added value, which is necessary for the community in order to reduce damage to health, environmental pollution and visual appearance. In this case, in the district of Barranca, the markets generate too much organic and inorganic waste and these materials can be used for farmers or businesses. In this regard, Ramírez León (2018), who based himself on the characterization of solid waste from Barranca -2014, mentions that the generation of municipal solid waste in this case from the markets is 6,289.71 Kg, which at 6.29 tons / day, 188.69 tons/month and 2295.75 tons/year.

For this reason, research was carried out on the use of market waste for agricultural benefit as a sustainable alternative. The objective was to determine the quantification and chemical characterization for the benefit of the community. Therefore, compost was made based on these residues and their chemical concentrations were analyzed for the agricultural benefit of the area.

Finally, it is worth mentioning that the purpose of this work is to find a viable alternative with a sustainable approach; since by giving added value to market waste, it will reduce the cost of vegetable production and the environmental risk in the city of Barranca.

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2. Materials and Methods

Methodology

It is based on the type of descriptive research; since a questionnaire was prepared on the proposal of market waste and its characterization in order to know its components.

Population

The population is the market stalls that on average is from 70 to 100 depending on the street vendors that do not have a stable place in the Miracle of Barranca market.

Sample

To obtain the sample, the number of market stalls was taken and with the sample size formula detailed by ECOTEC (2005) that mentions normal values as z = 1.96, which is 95% confidence, σ = 0.5 constant value. It was processed obtaining 50 positions in total to which one was surveyed per position. The formula is detailed below.

Equation:

$$n = \frac{z^2 \sigma^2 N}{e^2(N-1)+Z^2\sigma^2}$$

Where:
n = Sample size = 51 positions in this case we worked with 50 positions 1 per position was surveyed
N = Total population = 70 positions.
σ = 0.5, standard deviation.
Z = Its value is a constant, usually there are two values depending on the degree of confidence desired, with 99% being the highest value (this value is equal to 2.58) and 95% (1.96) the minimum value accepted to consider the research as reliable.
e = represents the acceptable limit of sampling error, generally ranging from 1% (0.01) to 9% (0.09), with 5% (0.05) being the standard value used in research. (ECOTEC, 2005)

Data collection techniques

As for data collection, the techniques of interviews, observation and analysis review were used. For which questionnaire instruments were developed on: What is your proposal on the use of compost based on market waste? In the evaluation of solid waste, they were written down in a notebook and classified by organic, inorganic, dangerous, sanitary and inert and weighed. References on the analysis of compost based on market waste from the district of Barranca were also used.

Statistical analysis

Once the data obtained from the evaluations of the questionnaire and the classification of market residues were processed through basic statistics and tables were prepared by day and month for the respective interpretations and analysis.

Procedures

They were made as follows:
Market waste was classified as: inorganic, organic, sanitary, dangerous and inert, then weighed, obtaining data for one day and per month from June to August 2022.

The residues were then detailed according to their rating per month, which allowed knowing the variation.
Compost was then made based on market waste and after 3 months a representative sample was taken for chemical analysis and the results were analyzed from there.

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Then a question was asked about for people of both sexes, aged 20 to 60 years, with academic education at primary, secondary and higher levels, who were surveyed on Do you know what market residues can be used? What can compost based on market waste be used for? Does compost based on market waste generate profitability? What is your proposal on the use of compost based on market waste? y Do you receive training on the management of market waste by the municipality?

Finally, the survey data was obtained and processed using basic statistics for their respective analysis.

3. Results

Characterization of market waste

According to the results of the characteristics of the market waste detailed in table 1, it can be seen that in the percentage of waste, organic waste stands out with 65.00%, followed by inorganic with 28.67% and others with 6.33% as sanitary, inert and dangerous. For what the population of Barranca is analyzed, it consumes mostly fruits, vegetables, cooked food and fish. This analysis is supported by Paredes A. (2021) who concluded that the types of waste in the Túpac Amaru market in the city of Juliaca for the year 2021 were food waste (24.13%), organic waste such as fruits, vegetables, wood and vegetables (17.41%), paper waste (16.97%), plastic waste (16.30%), cardboard waste (14.11%) and waste such as glass, metal and fabric 11.09%. Likewise, he highlighted organic waste that can be used as animal feed and/or agricultural amendment, the rest for recycling. On the other hand, in the Metropolitan city of Lima, Centeno A. (2019) concludes that the total generation of waste from the San Francisco market, in the district of Villa María del Triunfo, is 1.79 t/d. Of this amount, we must indicate that it is made up of 90.3% usable waste, of which 83% is compostable waste, and 7.4% is recyclable waste.

Table 1: Characterization of market residues

Characteristics	Quantity (kg/ day)	Quantity components (% /day)	Quantity by type of waste (%/day)
Inorganic waste	**111.97**		28.67
Metals	8.8	2.25	
Plastics	18.3	4.69	
Tecnopor	10.36	2.65	
Glasses	23.36	5.98	
Newspapers	8.83	2.26	
Cartons	42.32	10.84	
Organic waste	**253.84**		65.00
Fish	15.5	3.97	
Vegetable	52.36	13.41	
Fruits	38.98	9.98	
Cooked food	58.5	14.98	
Chicken feathers	88.5	22.66	
Dangerous residues	**4.5**		1.15
Batteries	4.5	1.15	
Sanitary waste	**12.7**		3.25
Sanitary waste	12.7	3.25	
Inert waste	**7.5**		1.92
Land	7.5	1.92	
Total	**390.51**	**100.00**	**100.00**

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Waste from markets per month

Concerning the waste generated per month in the Barranca district market, it is detailed in table 2, that organic waste obtained 68.13%, followed by inorganic waste with 26.63% and others such as sanitary waste, inert waste and hazardous waste with 5.24% of a total of 10,341 tons/month of a market. This result is analyzed by the fact that as the year ends, the increase in this waste is perceived, either due to the demand for the product and informality, which influences the increase in waste. According to the Provincial Municipality of Barranca (2018), it mentions that the development of the longitudinal axis of commerce has been grouped towards the north of the city on Gálvez and Lima streets and in the surroundings of the model market. We can see that the existing food and vegetable market infrastructure is extremely deficient (traders have invaded even a small sector of the old cemetery), which creates traffic congestion and a lack of sanitary conditions for food marketing. On the other hand, these amounts of residues are maintained with Huamaní V. et. to the. (2019), who mention food waste (food scraps, peels, fruit scraps, vegetables, and other similar) obtained 38.98% and inorganic waste such as paper, newspaper, PET-polyethylene terephthalate, metals, and others with 40.64 % and non-reusable waste with 20.38%. Therefore, these organic residues that stand out can be used to make compost.

Table 2: Waste from a market per month in the district of Barranca, year 2022

Types of waste	June	July	August
Inorganics	28.43	27.45	26.63
Organics	65.09	66.75	68.13
Dangerous	1.19	1.12	1.08
Sanitary	3.37	3.14	2.68
Inerts	1.92	1.54	1.48
Total (%)	100.00	100.00	100.00
Total (Kg/month)	10869.12	11318.52	10341.44
Total (tn/month)	10.869	11.319	10.341

Chemical composition of compost based on market waste

According to the results of the chemical analysis of compost based on market waste obtained from INIA - Huaral, cited by Cruz D. et al. (2022) that is detailed in table 3, indicates that it has an adequate concentration of organic matter; but low in nitrogen, phosphorus, potassium and other microelements such as magnesium. Likewise, it can be seen that it has a high concentration in pH with 8.54, which indicates alkalinity, humidity with 10.82% and electrical conductivity with 4.22 mS/cm, which means that it has a high concentration of salts. However, this result is favorable since it is in accordance with other such as Huamán M. (2019), who analyzed the chemical concentrations of market-based compost and determined that when monitoring the pH, it reached values above 8, producing precipitation of nutrients such as Potassium and Calcium, maximum average temperature at 30 ° C in week 10 of treatment; humidity reached 40%, amount of organic matter on average 20%, Nitrogen was 1.5% and Phosphorus a value greater than 0.5% at the end of the composting process. Likewise, these values can be compared with other sugarcane-based composts as investigated by López E. et al. (2017), mention that the compost obtained shows positive quality indicators, quantifying humidity with 59%, pH with 8.2; carbon-nitrogen ratio with 12.5; apparent density with 0.55 g cm-3, nitrogen with 1%, phosphorus with 1.3%, potassium with 1.1% and magnesium with 1.1%, as well as low salinity, which makes it possible to use it in agricultural activity. Based on the results, it is mentioned that it can be used for agricultural use

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Table 3: Comprehensive Analysis of Market Waste Based Compost

E.C. (mS/cm)	pH	Humidity (%)	O.M. (%)	N (%)	P_2O_5 (%)	K_2O (%)	CaO (%)	MgO (%)	C/N
4.22	8.54	10.82	12.93	1.06	2.17	0.65	1.81	1.30	7.07

Source: INIA (2021) Cited by Cruz D. et al. (2022)

Market residues that can be used

According to the use of market waste that is observed in table 4, it is indicated that 80% of the respondents mention that this waste can be used for the preparation of compost or food for small animals and 20% recycles inorganic waste. and trade. According to Vargas-Pineda O. et al. (2019), conclude that organic waste is an environmental problem, but by using alternatives such as composting, the nutritional content can be used, generating by-products with high added value. Likewise, Bernache G. (2019) mentions that in the separation of inorganic waste for its use, materials susceptible to recovery and recycling are handled, such as plastics, glass, metal, paper, cardboard and others.

Table 4: Market residues that can be used

	Organic waste	Inorganic waste	Other waste
Quantity (N°)	40	8	2
Percentage (%)	80	16	4

Use of compost based on market waste

Regarding the use of the compost that is detailed in table 5, it was obtained as a result that 70% of those who gave their opinion can be applied to vegetables such as lettuce, radish, beets and other crops; since it is available to farmers in the area, due to its simple preparation, which reduces the cost of synthetic fertilizers. According to Cruz D. et. to the. (2022) conclude that a higher dose of compost based on market residues obtained a higher yield of lettuce with 12.25 tn/ha, which differs by 40.81% compared to the control.

Table 5: Benefits of compost based on market waste

	Vegetables	Fruits	Trees boot
Quantity (N°)	35	10	5
Percentage (%)	70	20	10

Proposal for the use of compost based on waste markets

Regarding the proposal for the use of compost detailed in Table 6, it can be seen that 40% of the population states that it should be used as fertilizer, followed by parks and gardens with 24%, public institutions with 22%, marketing with 12% and 1% have no opinion. Therefore, it is interpreted that the population requires that this product be used efficiently before marketing with companies. Therefore, it is analyzed that the population prefers the use of compost based on market waste in agriculture; Since it is an alternative for the cost of synthetic fertilizers, it will improve soil conditions, strengthen the plant, reduce the cost of production and at the same time reduce environmental pollution. This analysis is based on Agraria.pe (2022), highlighting the statement of Professor Alberto Huiman Cruz, from the Environmental Management Engineering Career at ESAN University. Who exposes Faced with the current climate crisis and the shortage of fertilizers, it is possible and necessary to use organic waste, thus avoiding greenhouse gases

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and generating products such as compost, humus, biols, among others that can be used to improve soils in agriculture.

Table 6: Proposal for the use of market waste

	Parks and gardens	Agriculture	Public Institutions	Commercialization	No opinion	Total
Quantity (N°)	12	20	11	6	1	50
Percentage (%)	24	40	22	12	2	100

Compost based on market waste generates profitability

The use of compost made from market waste is a sustainable alternative, which is why 31% of respondents mention that it generates profitability, since it reduces the cost of synthetic fertilizer (See Table 7). Therefore, the use of this fertilizer is favorable for the production of vegetables. This analysis supports Macas G. (2020), who mentions compost is considered the best measure for soil recovery, in addition, it is easy to prepare and profitable if you want to market it, it also reduces the use of chemical fertilizers

Table 7: Compost based on market waste generates profitability

	Yes	No	No opinion
Quantity (N°)	31	12	7
Percentage (%)	62	24	14

Receive training on market waste management

Regarding the training of market waste management that is detailed in table 8, the respondents stated that 50% receive training from the municipality. This result is due to the fact that a part of the market workers have available times for meetings that deal with the improvement of the place and the treatment of waste in order to improve the quality of customer service. In this regard, Quiroz L. (2018) concludes that in the group of itinerant merchants of the Cajamarca District, 64% of the participants stated that there is no adequate identification of Ambulatory Commerce zones, 69% report that they do not receive training from the administration

Table 8: Receive training on the management of market residues

	Yes	No	No opinion
Quantity (N°)	25	18	7
Percentage (%)	50	36	14

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Figure 1. Production of compost based on market waste

4. Conclusions

- It was determined that the waste generated per day is organic with 65% inorganic with 28.67%, others with 6.33% and organic per month with 68.13%, inorganic with 26.63% and others such as sanitary waste, inert waste and hazardous waste with 5.24%. Therefore, it is evident that a large percentage of the waste is organic, which is viable to give it an added value and thus obtain a benefit for the community of Barranca.
- It was also determined that in the compost analysis the adequate concentration of organic matter percentage was obtained, but low in nitrogen, phosphorus, potassium, mycoelements such as magnesium and high in pH with 8.54. Therefore, this result indicates that compost based on market residues is viable for viable agricultural use; since when applied as fertilizers, nutrients are added that improve the properties of the soil and strengthen the development of the plant.
- It is concluded that, in the proposal for the use of compost based on market waste, it was known that it should be used for agriculture with 40%; so it is a sustainable alternative for the production of vegetables and is accessible at the lowest cost, it also reduces environmental and visual pollution.

References

Agraria.pe, 2022, Proponen empleo de compost como alternativa ante la crisis de fertilizantes. El compost es un mejorador de suelos. Agencia Agraria de Noticias. https://agraria.pe/noticias/proponen-empleo-de-compost-como-alternativa-ante-la-crisis-d-28290#:~:text=(Agraria.pe)%20%E2%80%9CFrente,los%20suelos%20en%20la%20agricultura.

Bernache G., 2019, Evaluación de los sistemas de manejo de residuos en cuatro municipios de Jalisco, méxIco. Revista Internacional de Contaminación Ambiental, vol.35, pp. 19 – 27. DOI: https://doi.org/10.20937/RICA.2019.35.esp02.03

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Centre of Research and Training for Regional Development
Online at www.journals.cincader.org

ISSN 2523-0905
DOI: https://doi.org/10.32829/eesj.v6i2.176

Centeno A., 2019, Propuesta de un plan de minimización de los residuos sólidos generados en el Centro de Abasto: Mercado San Francisco del distrito de Villa María del Triunfo, Trabajo de Suficiencia Profesional para Optar el Título Profesional de Ingeniero Ambiental. Universidad Nacional Tecnológica De Lima Sur. Perú. https://repositorio.untels.edu.pe/jspui/bitstream/123456789/520/1/T088A_47000858_T.pdf

CEPAL, N.U., 2022, Repercusiones en América Latina y el Caribe de la guerra en Ucrania: ¿cómo enfrentar esta nueva crisis? Comisión Económica para América Latina y el Caribe (CEPAL) y Naciones Unidad (N.U.), pp. 1-27. https://repositorio.cepal.org/bitstream/handle/11362/47912/3/S2200419_es.pdf

Cruz D., Gálvez E., Sotelo J., Pari A., Cahuana J. y Pari A., 2022, Fertilización a base de residuo de mercado para mayor rendimiento de lechuga (Lactuca sativa L.). Una alternativa sostenible. Revista Alfa, vol. 6, N° 17, pp. 336–345. https://doi.org/10.33996/revistaalfa.v6i17.172

Cruz Nieto, D. D., Rodriguez Espinoza, R. F., Legua Cardenas, J. A., Natividad Huasupoma, D. E., Ipanaque Rona, J. M., Abarca Rodriguez, J. J., & Ramos Pacheco, R. L., 2022, Analysis of the Yield of Radish (Raphanus Sativus L.) Fertilized with Compost Based on Organic Waste from Markets and Its Relationship with Its Stomatal Density. Chemical Engineering Transactions, Vol. 94, pp. 1387-1392. https://doi.org/10.3303/CET2294231

De La Torre R., Massa L., De La Torre R, Massa D., 2020, Aspectos ambientales del mercado Arenales, Ica 2020. Ñawparisun - Revista de Investigación Científica, vol. 3, no 2. Pp. 27 - 34. DOI: https://doi.org/10.47190/nric.v3i1.135

ECOTEC, 2005, Metodología de la investigación. Universidad Ecotec, https://www.ecotec.edu.ec/material/material_2019D1_CSC244_06_122532.pdf

García R., Ramón J. y Castellanos V., 2016, Análisis del Manejo de los Residuos Sólidos en el Mercado Central de Pueblo Nuevo, Santiago de los Caballeros, República Dominicana. Revista del desarrollo local y sostenible. Vol. 9, N° 25, pp. 1-14. https://www.eumed.net/rev/delos/25/residuos.html

Huamán Carranza, M., 2019, Concentración de nitrógeno, fosforo, potasio y calcio en el compost producido a partir de residuos sólidos orgánicos de mercados populares y residencias de Huaraz-Ancash. Revista Aporte Santiaguino, vol. 12, N° 2, pp. 264-273. https://doi.org/10.32911/as.2019.v12.n2.647

Huamaní V., Villafana J., Casanova J., Lira J., Asencio J., Quispe A., Roque A., Chumpitas C., Navarrete D., Hernandez F., Chavez F., Quinteros J., Sacsavilca K., Tarrillo R. y Yabar L., 2019, Estudio de Caracterización de Residuos Sólidos Municipales en el Cercado de Lima. Gerencia de Servicios a la Ciudad y Gestión Ambiental Subgerencia de Servicios a la Ciudad. pp. 1-56. https://smia.munlima.gob.pe/uploads/documento/70ac2582a8218dd9.pdf

López E., Andrade A., Herrera M., Gonzalez O. y García de la Figal Costales A., 2017, Propiedades de un compost obtenido a partir de residuos de la producción de azúcar de caña. Revista Centro Agrícola, vol. 44, N° 3, pp. 49-55. http://scielo.sld.cu/pdf/cag/v44n3/cag07317.pdf

Macas G., 2020, Uso de compostaje como estrategia de gestión de residuos orgánicos ganaderos en mutile Parroquia San Mateo-Esmeraldas. Previo a la Obtención de Título de Ingeniera en Gestión Ambiental. Pontificia Universidad Católica del Ecuador, pp. 1 -65. https://repositorio.pucese.edu.ec/bitstream/123456789/2165/1/MACAS%20TORRES%20GABRIELA%20ISABEL.pdf

Municipalidad Provincial de Barranca, 2018, Plan de desarrollo urbano de la ciudad de Barranca 2008-2018. pp. 1-14. https://eudora.vivienda.gob.pe/observatorio/PDU_MUNICIPALIDADES/BARRANCA/PDU-BARRANCA.pdf

Paredes A., 2021, Propuesta de Aprovechamiento y Valorización de los Residuos Sólidos Generados en el Mercado Túpac Amaru en el Distrito de Juliaca. Tesis para Optar el Título

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DOI: https://doi.org/10.32829/eesj.v6i2.176

Profesional de Ingeniero Ambiental. Universidad César Vallejo, Perú https://repositorio.ucv.edu.pe/handle/20.500.12692/78057?locale-attribute=en

Quiroz L., 2018, Diagnóstico Ambiental e Inclusión de Requisitos de Autorización del Comercio Ambulatorio Orientado a la Mejora de la Gestión de Residuos Sólidos en el Distrito de Cajamarca 2018. Tesis para Optar el Grado Académico de: Maestro en Gestión Pública. Universidad César Vallejo, Perú, pp. 1 -90. https://repositorio.ucv.edu.pe/bitstream/handle/20.500.12692/28953/Quiroz_CLE.pdf?sequence=4&isAllowed=y

Ramírez León W. Gestión de residuos sólidos en la provincia de Barranca. Una propuesta de mejoramiento al 2018, 2018, Tesis para Optar el Grado Académico de Doctor en: Gestión Pública y gobernabilidad, Escuela de Posgrado - Universidad César Vallejo, Perú. pp. 1-258. https://repositorio.ucv.edu.pe/bitstream/handle/20.500.12692/19073/Ram%c3%adrez_LWE.pdf?sequence=1&isAllowed=y

Swisscontact, 2016, Manual de gestión de residuos sólidos en mercados abiertos. Ecovecindarios trabajamos en comunidad - La Fundación suiza para la cooperación técnica. Bolivia. pp. 1-16. https://www.kioscoverde.bo/wp-content/uploads/2016/11/Manual-de-Gesti%C3%B3n-en-Mercados-Abiertos.pdf

Vargas-Pineda O., Trujillo-González J. y Torres-Mora M., 2019, El compostaje, una alternativa para el aprovechamiento de residuos orgánicos en las centrales de abastecimiento. Orinoquia, vol. 23, N° 2, pp. 123 – 129. https://doi.org/10.22579/20112629.575