

Solid Waste Management Packaging Pesticides in Agricultural Fields



B. Castillo-SantaMaría, JO. Ruiz-Tejada, BN. Larico-Quispe, M. Mendoza-Zuñiga, J. Quispe-Rodríguez

Abstract: *The main objective is to know the findings of farmers and competent authorities on solid waste management packaging of pesticides in agricultural fields. This research is descriptive character of non-experimental quantitative approach, where a survey was applied to 30 producers agricultural, based on 18 items, which grow crops of vegetables, sweet potatoes, corn, and asparagus. located in the Town Center Agua Dulce, 4 km from the district of San Vicente province of Cañete, Lima region, Peru, in an area of 200.83 ha. Result Review producers consider pollution and climate change are increased effect of solid waste packaging pesticides in agricultural fields. And it concludes which should promote training strategies and achieve decrease that plastics are thrown into agricultural fields and irrigation canals which then finally spreads into the sea, management should be led by the authority in strategic alliance with commercial houses chemical inputs in coordination with farmers.*

Keywords: *Management. You pesticides. Agricultural fields. Pollution. Climate change.*

I. INTRODUCTION

Agricultural fields are different production sites food crops during the production process from planting to harvest, agricultural pesticide applications are performed in different phenological stages of cultivation, to protect them from damage from pests and diseases.

Therefore, it is a problem for farmers collectors municipal waste work in rural areas, which affects steadily in the accumulation of plastic containers, bottles of pesticides and adding to this default system trading of chemical inputs in the collection after use of the product.

Consequently, the development of this research poses How is solid waste management packaging pesticides in

agricultural fields? Ministry of Agriculture and Irrigation (MINAGRI, 2019) argues that the management of solid waste are all activities technical administrative which tend to perform actions for planning, coordinating, arranging, designed to implement and contribute to policy assessments in the appropriate management of solid waste at the national, regional and local levels.

According to the legal regulations in Peru, the Ministry of the Environment (MINAM, 2005: 24,25) within its goal it is to ensure safety mim prove the quality of life of people, ensuring healthy ecosystems, sustainable over the long term; and sustainable development of the country, through prevention, protection and recovery of the environment and its components, the conservation and sustainable use of natural resources responsibly.

The In response in order to achieve the efficient and sustainable use of solid waste MINAM (2017) establishes a policy of extended liability to the producer, in order to minimize the impact on the environment, on the premise that there is a responsibility shared management comprehensively waste with society, which proposes guidelines: (1) promote the reduction of heavy use of goods and services, (2) develop sustainable actions in education and awareness of the population with the efficient and effective to minimize and recover solid waste, (3) develop technological research to achieve ecoefficiente production, (4) minimize waste solids at various stages of their life cycle, (5) promoting waste recovery and treatment before disposal, (6) ensure that the solid waste management minimizes climate change, (7) to guide the recovery of degraded areas Designated use inappropriate and uncontrolled waste solid among others, which will achieve a connection between society, local government, institutions and trading houses.

Solid waste of agricultural systems according to MINAGRI (2012) argues that management activities such as agriculture, forestry, livestock, poultry among others, is faculty of agriculture, which are subject to environmental certification, responsible for the management, handling and disposal of used packaging of chemical inputs. These containers are left scattered in the fields of crops, these being incorporated by agricultural machinery, while preparing the ground for planting crops, to this local government seeks to develop a joint work between institutions to raise awareness of farmers, for what (Child, Trujillo, & Child, 2017) report that the institutions involved aim to raise awareness,

Manuscript received on April 02, 2020.

Revised Manuscript received on April 15, 2020.

Manuscript published on May 30, 2020.

* Correspondence Author

Dr. Castillo-SantaM B.*, Professor at the National University of Cañete, Lima. – Peru. bssctll@gmail.com

Dr. Ruiz-Tejada, J.O. Academic Vicepresidente of the National University of Cañete. jose.rt14@hotmail.com

Dr. Quispe-Rodríguez, J. professor at the Universidad Nacional Autónoma de Huanta. juaquiro52@gmail.com

Mg. Larico-Quispe, B.N. Professor UNDC. blarico@undc.edu.pe

Mg. Mendoza-Zuñiga, M. Professor UNDC. marmezu@hotmail.com

© The Authors. Published by Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP). This is an [open access](https://creativecommons.org/licenses/by-nc-nd/4.0/) article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Faced with uncontrolled growth of "solid plastic waste" (PSW) they are presented wastes and is a great challenge for societies to achieve sustainability in its technological advancement " (El-Salem, SM, Lettieri, & Baeyens, 2009)

The pesticide containers, according to the Food and Agriculture Organization of the United Nations (FAO, 2008) indicates that they are rigid plastics made of HDPE, COEX, PET, polypropene, polyethylene plastic bags, metal, coated paper internal, used in agriculture, is based on geography, and agricultural fields, being used more frequently in campaigns cultivation. Usually these containers are scattered fields deficiency environmental awareness incorporated during the preparation of the field for planting new crops with a limited level management recycling by the competent institutions. So the "management inadequacy of agrochemicals and their containers is a serious problem for the environment, health and productivity of a country" Unit Environmental Research and Development, (UNIDA, 2007: 273), under this premise pollution of natural resources is latent, in the absence of policies for compliance with the gathering of pesticide containers in rural areas by trading companies. And the effective operation to achieve the recycling of pesticide containers is emphasized by Ferronato & Torreta (2019) solid waste that must have a useful treatment system in order to improve sostenibilenvironmental idad. So FAO (1995) consider that these containers must not be burned nor incorporated into crop fields. Therefore the authority competent National Health and Agrifood Quality (SENASA, 2015) reports that holders of records agricultural pesticides They must have a program for the disposal of chemical pesticide containers (H) involve local authorities and regional government, (i) control and monitor compliance with both the procedures and actions in the handling of empty pesticide containers. These guidelines are not met due to weak management of the institutions involved before it is necessary to generate awareness work among small farmers who are the majority in the valley of Cañete. According Gordon & Marrugo (2018) They refer to the practice of improper pesticide applications that generate residues in food being an environmental problem. Consequently, Lugo (2017) details the use of pesticides is a risk that ignore farmers and therefore is a health risk in the short term effect of low doses, which are also affected their families . A Forrest et respect to the. (2019) emphasize that the effect of plastic pollution deteriorates society, our economy and natural habitats.

The importance of recycling part to develop a set of procedures to reuse the materials for other uses, carried out by large-scale agricultural enterprises as part of their social responsibility. Goburdhun (2019) states that one should visit the camafterfarmers for specialized people to promote awareness in the practice of recycling. While that Imoro, Larbi, & Duwiejuah (2019) argue that farmers do improper practices and indiscriminate disposal of empty pesticide containers. Whereas for this, which are groups of agricultural producers engaged in small areas that do not have proper logistics and are not organized to implement recycling.

The alterations that occur in the environment are effects of climate change, resulting from the continued use of chemical inputs more booming producers, who see a need to preserve their healthy crops from damage that can cause pests and

diseases, in order to profit at the expense of excessive use of inputs of pesticides and therefore pollution. This implies a lack of management practices of packaging. So the Agricultural Research Institute (INIA, 2018) They reveal that the large amount of waste generated are bad practices and inadequate in removing pesticide packaging waste, considered hazardous waste. Huici et to the. (2017) reaffirms that the management of empty pesticide containers by farmers are inadequate ... which represents a major health risk and environmental pollution. Adding to this, Mavuka & Ndlela (2017) that pesticide containers are not biodegradable, so they generate environmental pollution. Adding to this, Prata et to the. (2019) TA, et to the. (2019) that the pollution generated by plastic packaging, is considered unsustainable in today's society, and threatens ecological systems and human health, despite mitigation recycling, this is increasing so suggest working in a multidisciplinary way.

Methodologies. The research was conducted in the Town Center Agua Dulce, 4 km from the district of San Vicente province of Cañete, Lima region, Peru, at an altitude of 4 m in an area of 200.83 ha., where vegetable crops, sweet potatoes, corn, and asparagus are developed.

It is emphasized that the population for this research consists of 51 producers, making survey only to residents, who number 30 representing the sample and the difference is not working in their fields, so leased to third parties.

The non-experimental parametric quantitative approach, descriptive method where the survey technique was employed to owners of the fields, with a questionnaire of 18 captured questions as an instrument, under a variable: Solid waste management, with three dimensions: first pollution , the second recycling and climate last change, with four measuring scale between dimensions recycled and climate shift from (1) very disagree, (2) disagree, (3) agreement and (4) strongly agree. And in very low, low, high and very high pollution dimension (1), which were analyzed by SPSS version 25.

II. RESULTS AND DISCUSSIONS

Determine solid waste management packaging pesticides in agricultural fields

Table I: Solid waste management packaging pesticides in agricultural fields

		Frequency	Percentage
Valid	Strongly Disagree	4	13.3
	In disagreement	two	6.7
	In agreement	9	30.0
	Strongly agree	fifteen	50.0
	Total	30	100.0

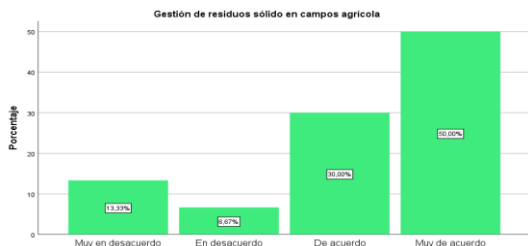


Fig. 1: Solid waste management packaging pesticides in agricultural fields

Interpretation: In the results obtained you show us that 6.7% of farmers believe strongly disagree, 13.3% of farmers disagree, 20% of farmers agree and 60% are very in accordance with this trend states that the agricultural fields are afectados by the lack of management in rural areas, that being compared to Goburdhun (2019) in his research "An Approach to the deposit-refund system of Empty Pesticide Containers in Mauritius "says should visit farmers' fields by specialized people to promote awareness in the practice of recycling, so it is necessary to make the management of solid waste specialists and the competent authority.

Determining solid waste management packaging of pesticides in agricultural fields, About contamination.

Table II. Pollution

		Frequency	Percentage
Valid	Very low	4	13.3
	Low	two	6.7
	high	3	10.0
	Very high	twenty-one	70.0
	Total	30	100.0

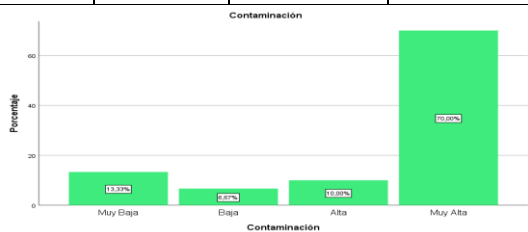


Fig. 4: Diagram of pollution

Interpretation: In the results you show us that 13.3% of respondents felt farmers is very low, 6.7% of farmers believe is low, 10% of farmers consider is high and 70% pollution is very high in the fields, reflecting that pesticide containers contaminate crop fields, which coincide with Prata et al. (2019) that the pollution generated by plastic packaging, is considered unsustainable in today's society, and threatens ecological systems and human health, despite mitigation recycling, this is increasing so suggest working in a multidisciplinary, these statements generate a greater awareness that the work articulated between those involved must be specified.

Determining solid waste management packaging of pesticides in agricultural fields Respect to recycling.

Table III. Recycling

		Frequency	Percentage
Valid	In disagreement	5	16.7

In agreement	13	43.3
Strongly agree	12	40.0
Total	30	100.0

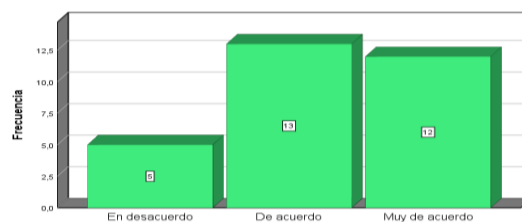


Fig. 5: Diagram recycled

Interpretation: In the results prove us that 16.7% of farmers believe that disagree, 43.3% of farmers are agree and 40% strongly agree, on solid waste management should performed in agricultural fields, this means that farmers consider whether to make recycling, from his workplace, coincidiendo with Ferronato & Torreta (2019) that solid waste must have a useful treatment system in order to improve sostenibilenvironmental idad, before reality arises the need to implement working systems between authority and farmers for Waste collection and recycling is promoted.

Determining solid waste management packaging of pesticides in agricultural fields With respect to climate change

Table IV. Climate change

		Frequency	Percentage
Valid	In disagreement	4	13.3
	In agreement	8	26.7
	Strongly agree	18	60.0
	Total	30	100.0

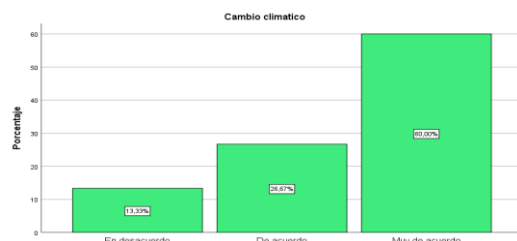


Fig. 6: Diagram of climate change

Interpretation: In the results it is considered that 13.3% of farmers who disagree, 26.7% of farmers are under and 60% strongly agree that climate change is the effect of pollution and lacking in solid waste management in agricultural fields, which MINAM (2017) He says that the policy of solid waste management is extended liability to the producer, in order to minimize the impact on the environment, on the premise that there is a shared responsibility for managing comprehensively waste along with society, so the work is set of people to achieve the management of solid waste pesticides, it should be part of a culture of social responsibility that many farmers, commercial houses, authorities manage to integrate environmental sustainability, climate change does not affect the biodiversity of the planet.

III. CONCLUSIONS

- 1) Management of solid waste pesticide containers farmland, the results we show that 6.7% of farmers believe strongly disagree and 60% strongly agree that the competent authority and houses commercial sales of chemical inputs perform the disposal.
- 2) In the solid waste management pesticide containers farmland, regarding pollution, it is concluded that 6.7% of farmers consider is low and 70% is considered high contamination of pesticides in containers agricultural fields, these being vulnerable in the fields of crops, running risk society and the environment.
- 3) In the solid waste management pesticide containers farmland, regarding the recycling show that 16.7% of farmers consider disagree and 43.3% of farmers agree that solid waste should be recycled. As should promote training strategies and achieve decrease that plastics are thrown into agricultural fields and irrigation canals which then finally spreads into the sea.
- 4) In solid waste management of pesticide containers farmland, about climate change indicates that 13.3% of farmers believe that disagree and 60% strongly agree that solid waste without recycling contribute negatively increasing climate change.

REFERENCES

1. El-Salem, SM, Lettieri, P., & Baeyens, J. (2009). Recycling and recovery routes of plastic solid waste (PSW): A review. Elsevier, 29 (10), 1-19. doi: <https://doi.org/10.1016/j.wasman.2009.06.004>
2. Carrasco, S. (2017). Scientific research methodology (THIRTEENTH ed.). Lima, Peru: San Marcos.
3. FAO. (nineteen ninety five). Guidelines for the management of small quantities of unwanted and obsolete pesticides. Rome: FAO. Retrieved from http://www.fao.org/fileadmin/user_upload/obsolete_pesticides/docs/small_qties_s.pdf
4. FAO. (2008). International Code of Conduct on the Distribution and Use of Pesticides. Italy: FAO.
5. Ferronato N., & Turret V. (2019). "Waste Mismanagement in Developing Countries: A Review of Global Issues". International Journal of Public Health Research and environmental, 6 (16), 1 - 28. doi: 10.3390 / ijerph16061060
- a. Forrest, Giacobazzi, L., Dunlop, S., Reisser, J., tickler, D., Jamieson, A., & Meeuwig, J. (2019). "Eliminating Plastic Pollution: How to Voluntary Contribution From Industry Will Drive the Plastics Circular Economy". *Frontiers in marine Mammals*, 6 (627), 1- 11. doi: <https://doi.org/10.3389/fmars.2019.00627>
6. Goburdhun, R. (2019). "An Approach to the deposit-refund system of Empty Pesticide Containers in Mauritius". Finland: Karelia. University of Applied Sciences. Retrieved from https://www.theseus.fi/bitstream/handle/10024/168914/Thesis_Resh_mee%20Goburdhun.pdf?sequence=2&isAllowed=y
7. Morante Gordon, C., & Marrugo Negrete, JL (2018). "Agricultural practices and health risks for the use of pesticides in agricultural workers subregion Mojana - Colombia". 9 (1), 1 - 12. doi: <https://doi.org/10.22490/21456453.2098>
8. Huici, O., Skovgaard, M., Condarco, G., Jors, E., & Jensen, C. (2017). "Management of Empty Pesticide Containers - A study of practices in Santa Cruz, Bolivia". *Environmental Health Insights*, 11, 1 - 7. doi: <https://doi.org/10.1177/1178630217716917>
9. Imoro, ZA, Larbi, J., & Duwiejuah, AB (2019). "Availability and use of pesticides by farmers in the northern region of Ghana". *Journal of Health & Pollution*, 9 (23). Retrieved from <https://dx.doi.org/10.5696%2F2156-9614-9.23.190906>
10. INIA. (13 February 2018). Retrieved from <http://www.inia.cl/blog/2018/02/13/recolectan-mas-de-mil-envases-de-plaguicidas-para-evitar-contaminacion-de-los-valles-de-azapa-and-Lluta/>
11. Lugo, LC (2017). Depression and exposure to pesticides in Opichén farmers, Yucatan, Mexico. Mexico. Retrieved from

- <https://www.mda.cinvestav.mx/FTP/EcologiaHumana/maestria/tesis/14TesisLugoL17.pdf>
12. Mavuka, R., & Ndlela, S. (2017). "Handling empty pesticide containers: Zimbabwe where to go?". Researchgate.net. doi: 10.13140 / RG.2.2.24391.50084
 13. MINAGRI. (2012). Waste management SOLIOS the agricultural sector. Supreme Decree No. 016. Peru: El Peruano.
 14. MINAGRI. (2019). Regulations solid integrated waste management sector of agriculture and irrigation. Resolution Ministerial No. 246-2019-MINAGRI. Lima.
 15. MINAM. (2005). General Environmental Law No. 28611. Law Peru: El Peruano.
 16. MINAM. (22 December 2017). Law comprehensive solid waste management. Legislative Decree No. 1278. Peru: El Peruano.
 17. Niño Torres, AM, Trujillo Gonzales, JM, & child Torres, AP (2017). Household solid waste management in the city of Villavicencio. A view from the interest groups: Company, State and Community. *Blue Moon* (44), 2-12.
 18. Prata, JC, Patrick Silva, HIM, Da Costa, JP, Mouneyrac, C., Walker, RT, Duarte, CA, & Rochas-Santos, T. (2019). "Integrated Solutions and Strategies for the Control and Mitigation of Plastic and Microplastic Pollution". *International Journal of Environmental Research and Public Health*, 16 (13), 1 - 19. doi: <https://dx.doi.org/10.3390%2F16132411>
 19. SENASA. (2015). Supremo Decree No. 001-2015. Regulation of the national system of pesticides for agricultural use. Peru .
 20. UNIDA. (2007). The problems and agrochemicals and their containers, their incienza health of trabajadores, the exposed population and the environment. Argentina. Retrieved from <https://www.aamma.org/dhhtpscargas/agroquimicos.pdf>

AUTHR PROFILE



Bessy Castillo-SantaMaria, Dr. Ing Agronomist, professor at the National University of Cañete, Lima. - Peru, of the Professional School of Agronomy, <https://orcid.org/0000-0001-5320-4005>, bsscstll@hotmail.com With doctoral and master César Vallejo University with degree of Engineer of the National University of San Martin, Peru. Research and publication of scientific articles in refereed journals. Specialist productive projects and governance.



José Octavio Ruiz-Tejada, Dr. Lic. Administration, Academic Vicepresidente of the National University of Cañete. Principal teacher attached to the Faculty of Business Studies of the University Enrique Guzmán y Valle, with professional experience in organizational lidergo. <https://orcid.org/0000-0003-4387-4085>, jose.rt14@hotmail.com



Juan Quispe-Rodriguez. Dr. Ing. Agronomist, professor at the Universidad Nacional Autonoma de Huanta, is Agronomist by the National University of the Center of the Center of the Peru (Huancayo, Peru, Magister Management Education University Cesar Vallejo - Peru, and PhD in Environmental Science and Sustainable Development by UNCP, <https://orcid.org/0000-0003-1767-686X>, juaquiro52@gmail.com



Bertha Nancy Larico-Quispe, Mg. Lic. Education, professor at the National University of Cañete. Teaching in Universities and Higher Institutes. University specializing in Management, Culture and Social Development, Human Resource Management, Scientific Research, Marketing, Leadership. <https://orcid.org/0000-0002-3786-1280>, blarico@undc.edu.pe.



Marleni Mendoza-Zuñiga, Mg. Lic. Ecotourism, professor at the National University of Cañete, with work experience in managing tourism empreas <https://orcid.org/0000-0002-4882-5592>

marmezu@hotmail.com