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Sustainable Management of Empty Pesticide Containers

Some 340,000 tons of primary pesticide packaging is estimated to be sent annually to the market [1]. Sooner or later this packaging becomes waste. Approximately 25% of this packaging is recovered and recycled and/or disposed of by container management systems (CMS). Globally, there are more than 50 systems of which some 40 systems are mature systems, others in a pilot or design phase. In Africa, there is one mature CMS (S-Africa) and 17 systems in a pilot or design phase. It is highly recommended that pesticide packaging immediately after the total transfer is triple or pressure rinsed [2]. Many pesticides are classified as dangerous goods (DGs) and require packaging systems that meet the design tests as outlined in the UN Recommendations for the Transport of DGs [3]. Thus, pesticide packaging is of high quality and, thus, represents a certain value and have frequently a second life (e. g. as a storage container for water or foodstuff).

About the Presenter

Detlef Doehnert, Chemist, PhD in physical chemistry, and Postdoctoral fellow at the University of Utah, Salt Lake City, USA, has worked for a multinational chemical company in the area of crop protection for more than 33 years, and has held various positions in research, production (Europe and Latin-America), marketing, head of contract packaging, packaging development and labeling, director of supply chain stewardship (including global anti-counterfeiting).

DISCLAIMER: **The information below represents the opinions of members participating from different countries expressed during the discussion and shall not necessarily be taken to reflect the official opinion of the DEH, UCT, SIDA or KemI.**

The discussion was structured around three questions and the key discussion points are presented under each:

Question 1: Why do some countries classify appropriately rinsed pesticide containers as non-hazardous while other countries do not? Does this mean such containers or recyclates made from such containers can be used for any purpose?

ZAMBIA: The appropriately rinsed pesticide containers are classified as hazardous and are used in the recycling program for non-consumable products such as fencing poles, conduit pipes, etc. Classifying them non-hazardous may pose a risk as some pesticide residue has been observed inappropriately rinsed pesticide containers.

UGANDA: It is difficult to determine whether the containers have been triple rinsed and therefore putting them to use may be hazardous. FAO advises that pesticide containers are not appropriate for the storage of water and comestibles, which may be understood they cannot be used for any purpose (**Presenter note:** this is not in line with the FAO position).

NIGERIA: I believe the rinsed containers still contain some percentage of the formulation. Apart from this, the chemical composition of the container itself may contain some hazardous chemicals, hence, it's not 100% safe for domestic reuse.

ZIMBABWE: Rinsed products will not be containing any visible residues, but the residues may still be present. Such containers can be used for other uses such as the construction of structures which are not linked to food or human consumption

MALAWI: Malawi Environment Act, a used pesticide container remains hazardous no matter how many times it is rinsed. At the moment there are no recycling programmes. They are simply accumulated and stored. Unfortunately for many countries including Malawi, there are no companies that can recycle these containers..

ESWATINI: Rinsed pesticide containers may still contain some amount of the pesticide and the content may vary due to factors such as the material out of which the container may be made, so it may be classified as hazardous. In the case of Eswatini, we have not classified empty rinsed containers in any way.

SOUTH AFRICA: The plastic containers may contain some traces of the chemical as tripple rinse methods are not applied equally well in all cases. It would wise to not allow any further use of such containers and to rather incinerate it. The control of the containers' lifecycle unfortunately has many flaws and the risk remains high.

TANZANIA: The empty containers of pesticides are triple rinsing to dilute the pesticide remnants and decrease concentration. Some farmers re-use the rinsed containers for storing food items due to inadequate knowledge about risks associated with pesticides.

PRESENTER NOTES: Studies showed that the cleaning efficiency (inside and outside of the container) is >99.99% of the original content. A refillable container is designed for multi-trip use, whereas the single trip container is for one use only. Rinsing of containers should take place after the transfer of the product is completed; the rinsate is to be added to the spray mixture.

Question 2: What are the reasons for container management systems to stop working after a limited time of operation? How can these obstacles be overcome in lower- and middle-income countries (LMIC's)?

There is a lack of resources, expertise, and knowledge on the products: Lack of resources could be a major cause and to guard against this, there is a need for the establishment of a sustainable funding mechanism right from the inception. This could be in form of levies or licensing. Train people on the ways of recycling. The other challenge could be the exportation of such waste, which is expensive. With inadequate funding that the Pesticide boards have, it's a great challenge to sustain such programs.

Legislation should be backed up with clear regulations and must be enforced: Lack of incentives for the returned containers and In Uganda, some of the containers are being sold to communities as water storage facilities.

Lack of proper infrastructures: There is a danger of pollution, poisonings, etc. involved therefore well-written regulations and strong

Poor management of funds: Money to manage the empty containers must be deducted from the sales. If the farmer is left with the responsibility of transporting empty containers, it will become a matter of economics. As long as there is some incentive to the farmer or his workforce, they will be more willing to keep the project going.

Lack of linkages among players in the value chain: Develop legislation such as Extended Producer Responsibility. Provide incentives at different stages of the value chain e.g. recyclers, transporters of containers and farmers. Provide linkages among players in the value chain.

The lack of political will to support and enforce the policy is always a situation. Governments barely give attention to the waste management sector because they believe it doesn't generate income. There is a need for leadership to lay the necessary foundations.

There is no support of the system: More so when people are using hazardous containers at the household level. It will be hard to maintain such a system. It could be overcome by supportive legislation focusing also on the waste hierarchy were "preparing for reuse".

Failure to bring all key stakeholders: Industry, retailers and distributors, local and national governments, as well as farmers and other pesticide users on board to be convinced of the need for, and the benefits of the program. Lack of clearly defined roles and responsibilities among the stakeholders.

Eco-tax possible in developing countries: The problem for many pesticide-related issues in developing countries is deep and hopefully that after COVID some are closing the gap for these issues between developed and developing countries, we are suffering big poisoning and mortality in many developing countries.

Borders around legislation and resources to sustain these CMS: they are quite costly like others have said and need legislation that will ensure they are well sustained.

Needed is legislation that supports container management: We need awareness raising and training at ALL levels.

No proper scheme for collection: In Tanzania, the obstacles can be overcome through the development of pesticide empty containers management schemes that will motivate the end users to submit containers to the sellers.

Question 3: What is the role of legislation? How can farmers be encouraged to return empty, rinsed pesticide containers to a dedicated container management systems?

UGANDA: In Uganda legislation articulates the roles of various stakeholders in the management of pesticide containers and determines the mechanisms for funding the scheme. The authority in charge of CMS should put collection booths in different locations near farmers.

SOUTH AFRICA: Clearly defines or distinguishes the duties of the stakeholders' obligation so that they can meet the detailed standards. Besides highlighting litigation due to improper management of containers, outreach programmers initiated by interested parties educating farmers on the required management systems can assist.

MALAWI: Legislation helps to promote responsible behaviour. Most LMIC does not have binding laws that demand responsible handling and disposal of used pesticide containers. Governments should come up with stringent measures to curb the malpractice.

NIGERIA: The role of the legislation is to have the policy in place for the proper implementation of CMS and support the enforcement of these policies. Farmers can be encouraged through the exchange for cash program of containers.

ZIMBABWE: The legislation can help institute some laws which will facilitate the disposal or return of empty rinsed containers to a dedicated container management system/facility. The farmers can be encouraged by incentivising them. Have public awareness campaigns.

ZAMBIA: We have an Extended Producer Responsibility which governs the container management systems. A sustainable system requires regulations to guide, encourage players and enforce certain provisions to ensure compliance.

ESWATINI: Legislation is important in making sure that empty containers are returned the system should also provide incentives for the return of empty pesticide containers

TANZANIA: The legislation should cover the issues on how the pesticide empty containers could be managed. The farmers can be encouraged by the provision of motivation (money when returning empty containers). The government can work together with NGOs to train the stakeholders on the issues of pesticide empty containers management.

IRAN: During the past six months we were also facing high uses of biocidal products against the COVID-19 with no regulations and as I mentioned there are no clear boundaries between pesticides and biocides.

Resources and Further Reading

1. K. Jones, The recycling of empty pesticide containers: An industry example of responsible waste management, Outlooks on Pest Management, April 2014, 183-186
2. https://www.youtube.com/watch?v=9nk1u53pHiY, https://www.youtube.com/watch?v=Xp3m15Rpwpc and https://www.youtube.com/watch?v=ahLzJXsVIrEACRC
   USA: www.acrecycle.org/ and InPEV - Brazil:sistemacampolimpo.com.br/index, http://www.youtube.com/watch?v=4mQvZI3DNFk www.youtube.com/watch?v=d8F_cyZGpRQ and ADIVALOR – file://localhost/France/ www.adivalor.fr:
   http://www.youtube.com/watch?v=AKc1Z0NIf24&t=49s
   PAMIRA – Germany: http://www.pamira.de/en/useful-information/video.html, http://www.pamira.de/de/wissenswertes/video.html
   Korea: http://www.keco.or.kr/en/intro/basis/contentsid/2026/index.do
3. https://www.unece.org/?id=3598 and transpositions for the various mode of transport and transpositions into international and national regulations
4. Roadmap for establishing a container management program, CLI, September 2015: https://croplife-r9qnrxt3qxgjra4.netdna-ssl.com/wp-content/uploads/2015/11/Roadmap-for-establishing-a-container-management-program_final_Sept.pdf and https://croplife.org/crop-protection/stewardship/container-management/
5. International Code of Conduct on the Distribution and Use of Pesticides Guidelines on Management Options for Empty Pesticide Containers, WHO/FAO, May **2008:** http://www.fao.org/fileadmin/templates/agphome/documents/Pests_Pesticides/Code/Containers08.pdf
6. Waste Framework Directive: http://eur-lex.europa.eu/legal-content/DE/TXT/?uri=CELEX:32008L0098 and "polluter pays principle" and the "extended producer responsibility: ec.europa.eu/environment/waste/framework/ ec.europa.eu/environment/waste/pdf/WASTE%20BROCHURE.pdf
7. https://en.wikipedia.org/wiki/Responsibility_assignment_matrix

The **Division of Environmental Health** (DEH) Pesticide Discussion Forum is a bi-monthly online seminar for pesticide regulators and resource persons, as well as students in the Post-Graduate Diploma in Pesticide Risk Management (DPRM). Our aim is to provide support for managing pesticide risks and implementing risk reduction strategies. DEH is based in the School of Public Health and Family Medicine at the University of Cape Town (UCT). **This Digest was produced by: Tatum Louw**| Forum Administrator | lwxtat001@myuct.ac.za. **Prof Andrea Rother** | Forum Moderator | andrea.rother@uct.ac.za **Acknowledgement**: *Financial assistance from the Swedish International Development Cooperation Agency (SIDA), has been arranged by the* ***Swedish Chemicals Agency (KemI)***

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