Guidance to Educators

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Pesticide Container Residue Removal Training Materials

Supported by a Grant from

The Pesticide Stewardship Alliance

St. Louis, Missouri, USA

Implemented by

ARROWCHASE, Inc.
Environmental Project Management

Vilnius, Lithuania

Acknowledgements

This project was conceived and largely implemented by Rob Denny, Arrowchase, a 30 year veteran of pesticide stewardship programs. During his career of implementing pesticide container stewardship programs, he often developed in cooperation with others, specific training modules or guidance for rinsing or recycling pesticide containers. He quickly recognized the need for visual aids to supplement the verbal or text instructions for training on pesticide container stewardship. Due to contractual obligations placed on these programs by public or private funding organizations, expecting due credit for their support, these training programs were difficult or impossible to edit by the average user. In many instances, educators and trainers suggested that what they truly needed was, yes, the ideas and information; but also a library of images that could be used for variable length training sessions for trainees of widely differing skills and aptitude. In short, they needed more flexible pesticide container stewardship training resources, especially the visual media.

In May, 2008 the Food and Agriculture Organization of the United Nations published: ***Guidelines on Management Options for Empty Pesticide Containers[1],*** *an addendum to their 2003* ***International Code of Conduct on the Distribution and Use of Pesticides[2].*** *This landmark event was the first attempt to establish minimal recommended practices for managing the handling and final disposition of empty pesticide containers around the globe. This author and others within The Pesticide Stewardship Alliance recognized the importance of this work, yet also that a guidance document is not a training program. To transfer this knowledge from the scientists and policy makers, through educational programme designers, to the users of pesticides in the field requires additional resource materials. These flexible visual aids to training, presented here, are an attempt to assist trainers in that knowledge transfer.*

This more than 18 month part-time effort was made possible only through the assistance of one organization and many individuals. The Pesticide Stewardship Alliance, under the Direction of Fred Gabriel-Chairman of the Board and Kevin Neal-President, assisted in the funding of this project. Without their financial support this program would never have been completed. Also, a number of contributors from Europe, Brazil, South Africa, Canada, and the United States: especially the contractors and Board Members from the Ag Container Recycling Council, provided invaluable information and constructive criticism that shaped and improved these training aids every step of the way. Although last mentioned, but surely the most constantly helpful in their insight and wisdom were the ongoing contributions of Nancy Fitz, US EPA Office of Pesticide Programs and Professor Don Mullins, Virginia Tech University. The support of these two giants in the field of pesticide container stewardship was essential.

The production of any "visual" aids to training must necessarily employ an artistic talent to complete that task. Artist: E. Kendra Denny, is currently a student in the Masters of Art Education program at the University of Maryland, College Park, MD, USA. Although she was minimally compensated for the 44 images presented herein, this final portfolio only hints at the number of original freehand drawings and sketches that were required to complete this project. The goal was presented to the artist to:

1) *portray any persons depicted as culturally, ethnically, geographically, and as gender neutral as possible. This required a number of trials to achieve or at least to approach these lofty goals;*

2) *develop a look that was neither too commercial nor manufactured in appearance; a look that might be reasonably copied in style if a nation or region felt the need for additional artwork. This meant avoiding most computer-assisted drawing programs used by graphic artists today, and;*

3) *keep the line drawings simple, yet drawn in a way that could work in either black-white-grayscale or coloured printing.*

Not one of us anticipated the number of changes in the drawings that would ultimately be required. The training programs were circulated for comment on at least 4 occasions, and every image was redrawn, as result of comments… at least once… and in some cases multiple times. Clearly, if this training package is accepted and used in the years to come, much of the credit should go to this illustrator.

Vilnius

TPSA's Container Residue Removal Training Materials

Introduction

When organized pesticide container stewardship programs appeared in developed nations more than 25 years ago, pesticide handler training became a necessary companion for improved environmental health and safety. Training materials evolved, usually fitting the resources available to the target audience: their language and their level of sophistication. In relatively rare instances, training was supported by quantities of visual aids, yet the predominant media was textural. Worldwide or even within nations, the instructions were sometimes slightly different or inconsistent. Training based on custom and tradition was just as likely as *best practice* education based on verifiable scientific research.

The FAO saw the need to develop more uniform guidance on pesticide container stewardship, correctly recognizing that regularized Code of Conduct would not only serve to protect human and environmental health, but would also create an improved model or direction for pesticide container stewardship programs around the globe. The output from an international panel of experts was published May, 2008 as *Guidelines on Management Options for Empty Pesticide Containers.[3, 4]* This Code of Conduct normalizes the FAO ideals for empty pesticide container management and provides instructions for emptying and handling smaller containers that can be held in hands, larger containers too heavy to be held in hands (drums), pressure rinsing of smaller containers and larger drums. This 2008 Guidance document is published in the 6 accepted FAO languages.

Implementing this Code of Conduct is now a task before the world community. In some instances, this is not difficult; in other regions of the world it is perhaps not as easy. Literacy or inability of anyone handling pesticides to read not only the FAO Code of Conduct but also the product label and any textural training materials remains a challenge in all pesticide stewardship and safety efforts. Political debates vary any listing, but there are approximately 195 recognized nations on the planet.[5] There is, however, less debate on the nations or regions with the highest levels of illiteracy: Afghanistan and some nations in Equatorial, West and Central Africa comprise the states with the lowest levels of *literacy.* [5]

The ability to read and understand any written language is not the only impediment to pesticide safety and container stewardship. In fact, the ability to read one or more languages worldwide is quite high. In ordinal ranking, one has to look below the 150 out of 195 listing of nations (lower 23%) to reach the less than 2/3rds level (66.6%) literacy.[5] Statistically then, the larger impediment to effective communication is often more the *choice* of language, as opposed to the *inability to read* and understand *any* language. The international organization, *Ethnologue,* estimates that there are 6,809 living world languages.[6] The challenge for disseminating textural knowledge, including any pesticide management knowledge, sometimes comes down to finding a way to communicate directly to the target audience in way that they can first acquire, then retain as memory. The 6 FAO languages are a good start, but only a start. And yet, no one would suggest that the FAO or any central organization print training materials into thousands of languages.

Finally, there is the limitation of words themselves. Arguably, all of us learn in slightly different ways, depending on our culture and experience. Yet, there are only a handful of types of learning and some

categories of mental processing predominate. In the world of agricultural and environmental safety training, information transfer, and presumably the transfer of the FAO Code of Conduct, this task is most frequently attempted through verbal and written instructions. Malcolm Caldwell, author of **Blink: The Power of Thinking without Thinking**; said, "We learn by example and by direct experience because there are real limits to the adequacy of verbal instructions." [7] This may be true, especially the assertion that verbal instructions are inadequate, but it also impractical, and possibly dangerous, to learn pesticide safety from *experience* alone. Visualization, demonstration by a competent expert, and finally, hands-on, adequately supervised practice are shortcuts to "try and fail" life experience and are possibly the most effective pesticide education tools. To achieve this end, the first step toward increased memory cognition, or desirable conduct for handlers of pesticides containers, could be visual images to better imprint any best management practices. According to a recent article in Memory and Cognition: "*The picture superiority effect has been well documented in tests of item recognition and recall."[8]* Images, better than text, or in addition to text, give our minds a mental experience that is far more indelible.

In 2008, The Pesticide Stewardship Alliance recognized the contribution of the FAO Code of Conduct for pesticide container stewardship. This project was funded to 1) better implement the Code and 2) address, if possible, situations where even the most basic resources for pesticide management and communications were stressed or lacking, and yet dramatically improve the acquisition and retention of fundamental pesticide stewardship principles. The organization, TPSA, is an alliance of regulatory or public sector interests, academia, and private sector- industry concerns. [9] It was founded in North America, although it has grown to encompass stewardship issues and solutions in South America, Asia and Africa. A core group of TPSA active participants have developed pesticide training programs throughout the US and Canada, a relatively well resourced agricultural community, but others within the organization have also worked on continents and in countries where there are few resources, not only for training, but also resources for adequately rinsing crop protection and other pesticides containers.

The FAO Code of Conduct and the Guidance of 2008, if followed as *written*, would be a significant improvement on most regional, public and private stewardship practices around the globe. Therefore, this project is not attempting to change the message of this FAO Guidance in any way, but strives to provide a *visual* supplement and suggestions for the development of training materials to transfer knowledge of a few, but extremely important sections on residue removal and even more important points regarding final container disposition. Specifically, the project targets Section 1.5.5 Triple Rinsing for containers small enough to shake *and* for containers that are too large to shake; Section 1.5.6 Pressure Rinsing and select, important messages from subsequent sections on rendering containers unusable and brief messages regarding final disposition.

The inspiration for these TPSA Training Aids to Residue Removal builds on and owes a debt of gratitude to many prior efforts, especially a number of CropLife efforts around the globe, [10, 11] the ACRC training programs in the US [12, 13] that were also incorporated into the ASABE Container Rinsing Standards [14] and a number of University training programs,[15, 16] especially the illustrations accompanying the Purdue University training on Pesticide Container Management[17].

How the Training Materials Are Organized

The TPSA Training materials mirror, and indeed track almost verbatim, 4 of the 6 types of residue removal expressed in the May, 2008 FAO Guidance... The 4 residue removal procedures that are supported by TPSA Training materials are:

TPSA	FAO Guidance
3RS	1.5.5 Triple Rinsing *for containers small enough to shake:* p10
3RL	1.5.5 Triple Rinsing *for containers that are too large to shake:*p10-11
PRS	1.5.6 Pressure Rinsing (for small containers) p11
PRL	1.5.6 Pressure Rinsing (for larger containers that are too heavy to lift above the spray tank) p12-13

What the TPSA Training Materials Do NOT Cover

FAO Guidance Section 1.5.7 Integrated Rinsing – a residue removal system completely dependent on the design and operational characteristics of a manufactured, proprietary mechanical rinsing device. If training and guidance is needed in a particular agricultural zone where devices of these types are utilized, then trainers will need to first familiarize themselves with the manufacturer's instructions, visual aids, and determine if training would benefit the environmental health of any users, particularly in the steps prior to or after using any integrated rinsing device. The author felt, and reviewers agreed, that it is unlikely that any *universal* training aids could further improve the stewardship for using these mechanical aids to handling.

FAO Guidance Section 1.5.8 Solvent Rinsing – Most modern pesticide formulations are either dry or liquid water soluble formulations in water, or aqueous based suspensions, or water dispersible granules.

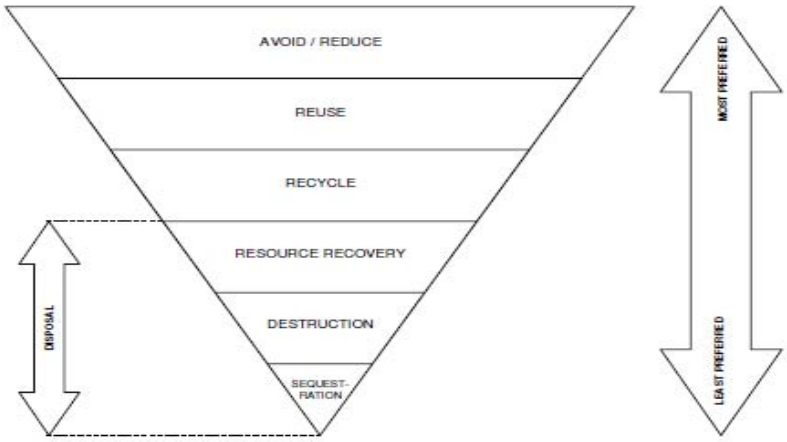
Formulations that require fuel oils or other solvent based mediums for dispersal and sticking to a target site are increasingly rare. Nevertheless, if in a given agricultural region, solvent based mediums are used; the trainer could adapt the TPSA Aids to Training for rinsing. For solvent residue removal, the principles are the same for triple rinsing small or large containers: careful agitation, adding the rinsate to the formula as part of the dilution volume, puncturing the container and proper disposal/recycling.[1] In black and white format, the similar images could be used. For colour, the trainer will probably want to change the blue pigment of the rinsate that is universally associated with clean water. This colour change can be easily made on the raw images using a computer assisted drawing programme. Additionally, the trainer will undoubtedly want to stress Personal Protective Equipment that protects the mixer–loader from solvent vapours. Although graphically representing a proper respirator on the figure will be difficult for most of

[1] It is unlikely that pressure rinsing using a solvent based system is ever a wise option.

trainers, it is much easier to remove the suggestion of an unprotected chin (mouth-nasal area) by simply cropping out that ambiguity (chin) completely.

Relationship of Container Value and Final Disposition-The Guidelines on Management Options for Empty Pesticide Containers contain discussions on the various options for disposal and protecting the public and the environment through disabling the container as a vessel. This important step of puncturing discourages the reuse of pesticide containers for some other inappropriate application and IS covered in each of the training series, even if not mentioned in the FAO guidance.

The FAO and other UN organizations have adopted a Waste Management Hierarchy (2008 FAO Guidance p6) that demonstrates the relative desirability of all final disposition options, whether geographically available or not. As the various footnotes attached to the four training series suggest, it is important that each designer of regional/national container stewardship programs familiarize themselves with the highest locally available options on the internationally accepted hierarchy for waste disposal or other preferable waste avoidance. This impacts the training message for both the properly rinsed container but also any closures. There are a few images suggesting either recycling or disposal of both caps and containers, but the final message of the best practices remains the responsibility of the trainer.



The FAO Waste Hierarchy

Personal Protective Equipment-Training on PPE is not the topic of these visual aids to implementing the FAO Guidance on Residue Removal; there are many other sources for this information. Trainers are cautioned not to derive any information from the drawings as to types of proper PPE or methods of using PPE. Instead, each training programme should strive to incorporate the requirements on the label

for common pesticides used in the agricultural or other pesticide use area. One reviewer, at the end of this programme effort, offered the criticism that the sleeves depicted on the applicator should be outside of the gloves. That is, in fact, normally how the PPE should be worn. In retrospect though, it would have been difficult to draw a figure supposedly wearing gloves without showing the cuffs of those gloves. In the final analysis, the trainer or designer of the training programme should use this opportunity to reinforce proper PPE usage in addition to proper residue removal procedures.

Suggestions on Using TPSA Training Materials

The author, using the numerous comments and support from TPSA and others around the globe, has attempted to provide a flexible collection of tools for training pesticide users on pesticide container residue removal and basic stewardship. The images themselves do not stand alone; just as has been pointed out previously, words themselves sometimes lack the necessary ability to convey ideas. Yet, the two together: words[2]+ images, can and often do have that impact. The four packages of images are provided in three formats: Adobe Acrobat, Microsoft Word and Microsoft PowerPoint. The Adobe Acrobat or *.pdf version is useful for a trainer interested in accepting the package as written and drawn with no modifications. The Word version is presented only in the international A4 paper size format. North American and a few Latin American users attempting to print these pages on "Letter" size format will find that some image spacing and particularly footnote formatting will be disturbed. By referring to the Adobe Acrobat version, the trainer should be able to adjust the formatting for proper presentation. The training materials can be printed in booklet form or scaled up to poster size to be used as flip charts[3]. A separate file of basic raw images is also included in PowerPoint format for that medium of training. Any of the three formats *can* with the appropriate software/scanner be used as a source for converting and saving a graphical file that can then be digitally modified and reassembled to convey a custom message appropriate for any geographical area or nation.

Note well that any words taken directly from the 2008 FAO Guidance are printed in *italics.* If the author or others believed that the FAO contributors intended or should have intended additional language for clarity and completeness, those words are printed in **normal** type font.

One other file format is included, and that is a collection of images assembled into a B3 poster paper format. The file is presented in Adobe Acrobat (*.pdf), but most will want to utilize the also included Word format to customize the text and graphics for conveying the message intended. Posters do not take the place of training but are a helpful reminder to those who have been trained about the steps necessary for effective residue removal. Designers and promoters of training programmes also have the opportunity to change the format and colours of the poster and even add a logo and other contact information of the sponsoring organization.

There is one other medium for indelibly imprinting best practices in the minds of users and that method involves hands-on experience. The written and spoken words in a language the user understands and a strong visual image are a powerful starting point, but repetitive practice is even better. Actually having

[2] In the language of the intended trainee.

[3] ISO 216 papers, including A4, have the distinct advantage that they maintain their aspect ratio of 1:1.4142 through any other ISO standard paper size, smaller or larger.

each and every trainee take the spoken and visual instructions that they have received, and put each step into practice is the ultimate goal for conveying residue removal. Yet, using pesticides for residue removal practice in a field or class room setting is, of course, unsafe. What many trainers have used is any viscous, concentrated solution or slurry that roughly resembles an actual concentrated pesticide. Examples that have worked well are molasses, powdered milk, and even various milled grains. An added bonus for instilling awareness for the necessity of using PPE is the inclusion of a strong, intense (washable) dye and even a normally invisible ultraviolet agent mixed into the faux pesticide. At the end of the training session, many trainees have been surprised at the number of places on their clothing and body that splattered or fluoresce as a result of their first attempts at *careful* rinsing.

Next Steps

The author-manager of this effort, Rob Denny of Arrowchase Environmental Project Management, The Pesticide Stewardship Alliance, and the many persons who contributed to this programme, have attempted to provide a collection of useful tools to trainers for pesticide container residue removal. Despite many hours of effort, we know that there is room for improvement and possibly even errors. If you have suggestions for changes, improvements that you would like to see, please contact:

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A Word on the Use of These Materials

The author, Arrowchase, and TPSA intend that these training materials be freely used for promoting the safe use and appropriate final disposition of pesticide and other crop protection containers. Nevertheless, all rights are reserved. Reproduction and dissemination of these materials for educational and other non-commercial purposes are authorized without any prior written permission from the copyright holders provided the source is fully acknowledged. Reproduction of material in this package for sale or other commercial purposes is prohibited without written permissions of the copyright holders:

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