

Implication of periodical inspections of sprayers already in use on work safety

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Abstract

Periodical testing and inspections of sprayers are considered an essential tool in reduction and correct use of plant protection products. Therefore in many European countries, as well as in some Italian regions, these tests are compulsory. The tests are carried out according to standard methodologies, where the machinery safety is not directly included in the inspection. The aim of the paper is to stress which points of testing methodology are directly or indirectly related to the operator safety and which points are susceptible to be modified or implemented in the methodology in order to enhance the safety of spraying for the farmer. After both an analytical analysis of the methodology and the potential risks of spraying for the farmer, some suggestions are given in the paper in order to better clarify this issue and a proposal of integration of periodical inspections with safety control of the machinery is given.

Keywords: plant protection products, periodical inspections, testing, spraying safety, standards.

Introduction

The controls and inspections of agricultural sprayers are developed for different purposes. They occur at different steps in the life-cycle of the machinery. In general a number of ISO standards for the testing of sprayers are available, which all contribute to a high level of state of the art of sprayers. An excellent review of standards related to pesticide application is given by Herbst and Ganzelmeier (2002). At a national level, for example, the aim of voluntary certification of a new sprayers is to test the functionality and the performance of a given model sprayer (according to the European standards EN 12761) and also to check the respect of safety rules (Italian laws: Dpr 459/96, Dlgs 359/99 and Dlgs 626/94). During the life of the machinery, a periodical control should be required in order to verify if different parts and features of the individual machinery are still in adequate conditions to achieve better application of plant protection products (Gil, 2007; Biocca, 2007). The tests are carried out according to standard methodologies, where the machinery safety is not directly integrated in the inspection. In fact, as stated in the EN 13790:1-2 (EN, 2003) and in the Enama Documents n° 6-7-8a (Balsari *et al.*, 2007), the scope of the inspections is related to reduce environmental risks, to achieve a good application of plant protection products and to reduce the hazards for the test operator.

With the objective of improving the safety use of plant protection products, in July 2002 the Commission of EU established a new Thematic Strategy on the Sustainable Use of Pesticides. Ultimately, the proposed measures (that include the certification of the new equipment to be placed on the market and “a regular and compulsory inspection of application equipments”) are contained in a forthcoming Framework Directive (European Commission, 2007). Therefore, in the next future the inspection of sprayer in use will be organized on a regular and extensive programme in each member state.

Nevertheless, the sprayer safety should be maintained and assured in the entire life-cycle of the machinery and the periodical inspections can represent the event to check the maintenance of safety rules and standards (EN 907, 1997).

The aim of the paper is to check which points of testing methodology are directly or indirectly related to operator's safety and which points are susceptible to be modified or implemented in the methodology in order to enhance the safety of spraying for the farmer. Consequently an integration of periodical inspections with safety controls of the machinery may be implemented. Furthermore, since the methodology requires that the sprayer's owner should be present at the inspection, there is the opportunity to advice and train the farmer about the safe use of the machinery.

Test methodology and potential revisions

The use of pesticides in agriculture introduces hazards and health risks to personnel involved in handling and application tasks. The main hazard to operator health is direct chemical exposure, particularly during mixing and loading. Both engineering controls (induction bowls, closed transfer systems, etc.) and personal protective equipment reduce exposure to pesticide. The other hazards related to spraying work are related to the general machinery use. They are included in the general requirements standards of agricultural machinery (EN-ISO, 2005).

At the present, the documents Enama n° 6 (field crop sprayers) and n° 7 (orchard sprayers) are considered as the reference methodology at national level for the testing of sprayers already in use. The following points of the methodology are directly or indirectly related to the safety.

Enama documents reference		Parts and functions considered
N° 6	N° 7	
1	1	Power transmission parts
-	2	Blower
2.4	3.4	Pressure safety valve
3.1	4.1	Spray liquid tank (leakages and closure)
3.2	5	Chemical introduction container
4	4.1	Cleaning device for products containers
5.1	6.1	Visibility of measuring and controls systems
5.2	6.2	Manometer position and scale
6	7	Pipes and hoses
8.1	-	Boom: stability, locking device, reliability of height adjustments
9.2	9.2	Nozzle dripping

According EN 907, the following points are recommended as controls related to sprayer's safety to be implemented in the test methodology, in order to carry out a test including all the work safety aspects.

The main requirements are as follows:

- Stability of the machinery on an incline of at least 8.5° in any direction.
- Spray boom:
 - if at front, cab required;
 - maximum height at folding/unfolding: 4 m.

- Spray tank:
 - filling hole not more than 1500 mm from ground and 300 mm from tank rim;
 - at least 5 % oversize;
 - no operator contamination in case of leakage.
- Hoses and pipes:
 - if cab, no hoses in the cab allowed;
 - if no cab, hoses shall be covered;
 - marked with allowed pressure.
- Clean water tank with at least 15 l.
- Instruction handbook required.
- Presence of safety and instructional signs.

Conclusion

The extension and diffusion of periodical inspection of sprayers will be common in the next future according to the incoming European directive, that assumes that in all member states will be a "regular and compulsory inspection of application equipments". In this context may be useful to take advantage to implement a safety test of machineries during periodical inspections, related both to the respect of safety rules and farmer's training and information. This can be achieved implementing in the compulsory inspection of sprayers already in use a little number of further tests strictly related to the work safety.

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