

Review

Studies Regarding the Set of Actions Needed for Fitosanitary Treatment in Order to Reduce the Environmental Impact

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Abstract

In general the main objective of phytosanitary treatment is to be at high qualitative level, in high security conditions and with low environmental impact. From this point of view there are some conditions, which must be accomplished by the employees and by the agricultural sprayer machineries. This paper studies the order of actions needed for phytosanitary treatment of agricultural crops in order to reduce the environment pollution, to assure the food security and employees' security.

Keywords: phytosanitary treatment, pollution, sprayer machinery, good practices guide

1. Introduction

Today the use of agrochemicals remains the main method for crop production increasing and for high economical efficiency in agriculture. When it is used an approved pesticide the main objective is to apply the right quantity on the specified target [12]. This operation must reduce at maximum losses caused by drift and by inadequate use of the spraying machine. The good practices guide is meant for the peoples who use agrochemicals, especially for the food product production [8, 9].

2. Staff training, machines selection, use of agrochemicals

2.1 Staff training

The employees that work with the spraying machines must follow a training programme before they use the agrochemicals [8, 9].

2.2 Choosing of spraying machines

The main objective for a spraying machine is to assure the proper application of agrochemicals without any danger. At a moment, in some countries, there are available checking norms for these machines, before that they will be in use, after which a quality certificate will be issued.

The use of electronic devices and GPS will lead to higher quality indexes, but these devices demand skilled personnel.

2.3 Proper use of agrochemicals

The use of agrochemicals will be approved only if required economical conditions demand their use, but only with scientific requirements on the product label

2.4 Personnel exposure

For personnel that work with agrochemicals, for their safety, it is necessary to use protective clothing. Also, it is recommended regularly to check the personnel health. Also, in treated areas the

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access must be restricted and must be forbidden for livestock [10].

3. The decision taking process

The use of agrochemicals may put in danger people, other life forms and environment. The decision of use agrochemicals must not be applied until other methods of crop protection, without agrochemicals, were studied.

3.1 Alternate methods for crop protection

The crop protection, without agrochemicals, can apply natural methods and crop control methods.

The natural control can take in view the insect natural enemies and crop control methods deals with crop rotation, crop selection and crop technology.

3.2 Hazards and advantages

The risks and advantages of certain type of agrochemical must be studied before its use, so the negative effects must be at a minimum.

In some cases, prophylactic treatment, e.g. for seeds, may be used, but weeds, insects and diseases effects on crop production must be checked in order to find out the moment in which a agrochemical substance may be used from economical point of view [10].

This study is made through regularly check of crop status in order to find out the appearance frequency of insects or precincts of weeds.

3.3 Agrochemicals solution mixing

The application of different types of agrochemicals, in the same time, may lead to a high quality treatment, but the treatment period should be the same and the products should be compatible. For some types of agrochemicals may be used direct injection-spraying machines, which combine the agrochemicals with water during work in the machine boom [7].

4. Security

The global security of agrochemicals must be the main objective for all users, dealers and sellers of such products.

4.1 User health control

The health of the ones who work with agrochemical must be controlled. This control must include the presence of a record card, which may evidence the change in the health status of the working personnel [3, 5].

4.2 The moment of use

The treatment optimum period is depending on crop, development status of weeds, diseases and insects. Also, this period is influenced by climate status, like temperature, relative humidity, wind speed and by the possibility to rain.

4.3 The transport and storage of agrochemicals

The transport of agrochemicals can be controlled by national norms, that regards moving of hazardous products, which must foreseen the emergency procedures in the case of an accident.

The storage of agrochemicals must be made in custom made warehouses that cannot be near to food products. The working personnel must wear approved protective clothing.

4.4 Package handling

It is forbidden to use the package after there were emptied. The package must be washed using the equipment provided by the spraying machine.

5. Agrochemicals application

5.1 Needed steps before work can begin

The selection of spray machine must respond to demands regarding the working conditions and the type of agrochemicals. E.g. for application of substances at ultra low volume are available custom build machines

Before starting the work must be checked the technical status of all equipments related with personnel safety and comfort.

The spraying machine, with tank filled with water, will be put in action at a working pressure higher than normal use liquid pressure, in order to check the hydraulic circuit for leaks.

The main tank of the spraying machine must be checked for leaks and a good status of liquid filters. All the parts connected to the main tank must be in good working conditions.

Booms must have a good suspension, the raising system must work in good conditions and also the folding mechanism.

Nozzles must not be worn-out or engrossed and antidrop systems must be watertight.

The cabin of self-propelled spraying machines and the cabin of the tractor must have an adequate filter, which can be regularly changed.

The worker must be sure the all systems for control and adjusting work as should be. If the adjustments are made by electronic devices, the worker must be aware about their proper use.

The worker must know the order of activities related to machine practical use, its stop or

its repair in a case of malfunctions during the working process.

Each spraying machine must be adjusted according the manufacturer specifications, after each repairing activity.

The liquid flow adjustment is influenced by three factors: working speed, working width and liquid pressure.

In the moment of agrochemicals handling the worker must wear the protective clothing. For safety reasons, at a moment are available transfer devices case in which the worker does not come in direct contact with the agrochemical substance [4].

5.2 Field applications

The decision of using of certain type of agrochemicals must take care of the effect on the environment. The field control can find out the sensitive places, like water flows or fauna

The treatment efficiency is mainly influenced by wind speed, its direction, temperature, humidity and rain frequency. If the treatment moment is well chosen it will be necessary a low number of successive treatments. The use of a software based model can foreseen the right treatment moment in order to reduce their number. The main machine adjustments in the field depend on working speed and boom height from the target surface. For spraying machines the working speeds depends on the boom stability, which is influenced by leveling status of the fields.

The nozzle height from target surface can be adjusted in field conditions, in order to assure the best distribution uniformity. A higher height promotes the apparition of the drift phenomenon and if it is too low, the bands with low and high dosages will appear.

The place in which the filling machine is made must be arranged with a washing protected surface, which will retain the washed liquid.

All personnel must be very well trained in the handling of package for agrochemicals, to open different types of lids, to measure and to add substance in the tank without any loses. The used package in washed and then can be destroyed. The washing of the used package must be made after its depletion and the obtained liquid is then infused in the main tank. After treatment around the surface will be placed guides, according the specifications on the label. These guides will warn the people about the type on the treatment.

5.3 Post-application activities

Security remains the main objective after the treatment with agrochemical substances [7, 9].

- **washing of the spraying machines**

After the use of the spraying machines they must be washed inside and outside, in the field and the obtained liquid will be delivered on the treated surface. Many actual machines have an integrated system for main tank washing.

- **the annihilation of solution excess**

The solution over plus, used protective cloths and other used materials must be destroyed in specialized units.

The solution over plus can be delivered on the treated surface, so during the work the amount of solution must be adjusted so at the end of the work should remain as less as possible.

- **the annihilation on used agrochemicals packages**

Before their destruction, the used packages must be washed by using special nozzles or manual washing. The washing must be made at once after their depletion.

The emptied packages can be buried in the ground at a depth over 1 m, or can be burnt in specialized units.

- **the maintenance and repairing of spraying machines**

When the treatment period is over, the sprayer must be prepared to be deposited and this activity is made by the workers that will wear the protective clothing. They will wash the inside and outside surface on the machine and also the hoses that form the machine hydraulic circuit. Also, they will check and clean the cocks.

The nozzles and filters will be washed and then deposited.

The pumps will be checked and, if it is necessary, the workers will do the necessary maintenance operations according manufacturer specifications

As mentioned, the workers will check all the other parts of the machine (manometers, distributors, valves etc.).

6. Activity evidence

The evidence of agrochemicals use is a proof of a good management, so at any moment can be checked the desired elements when a negative effect will occurs [2, 7,10, 12].

The following information must be included:

- date and the place of the treatment;
- field location;

- crop and its development status;
- pests and their development status;
- total used quantity;
- used water volume;
- information regarding not-treated barriers;
- notes regarding errors and other problems;
- worker name;
- neighbouring crops;
- used products and dosage;
- information regarding the mixture;
- used protective clothing;
- climate conditions;
- worker exposure and length of time.

For a good evidence work it would be necessary to use a form, which must be filled by the ones who oversee the work or by the workers.

If some repairing activities were made, they should be mentioned in the inscriptions.

If the worker's health must be controlled, each employee will have a file that will contain data about their health, the length of the exposure to chemical substance and the type of the agrochemicals that were in contact with the employee.

7. Conclusions

This paper showed the complex relationship between worker – spraying machine – agrochemical substance in order to reduce environment pollution, food security and personnel security.

This study emphasizes all the factors needed for developing of a good practices guide and for setting up, at a national level, of legislation in the field of agrochemicals use on the fields, for crop protection, in the actual terms for sustainable protection of the environment or biosphere.

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