

RESEARCH ON IMPROVEMENT OF SPRAYING MACHINE IN VINES PLANTATIONS, IN ORDER TO REDUCE DEGREE OF POLLUTION SOIL

CERCETĂRI PRIVIND PERFEȚIONAREA UNEI MAȘINI DE STROPIT ÎN PLANTAȚIILE DE VIȚĂ DE VIE, CU SCOPUL DE A REDUCE GRADUL DE POLUARE AL SOLULUI

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Abstract. *With all the important advantages in the use of pesticides to combat diseases and pests, their widespread use in high doses and repeated cause many ecological inconveniences, especially on soil, which is an important environmental factor, it is a fundamental support for the existence of life. These effects may be of ecological demo that is those affecting populations and especially their density and nature biocenotic - those causing ruptures biocenotic balances. To limit the effect of pollution treatment plant vine plantations, the USAMV Iasi, equipment was designed and developed to recover some material dispersed plant by spraying machine TARAL 200 PITON TURBO, which was not retained by foliar system of plants. Also spraying machine in intensive orchards and vineyards was equipped with air suction nozzle from LECHLER IDK 120-02, which can reduce drift droplets dispersed by up to 90%.*

Key words: *nozzle, pollution, recovery, spraying machine, soil.*

Rezumat. *Cu toate avantajele importante pe care le prezintă folosirea pesticidelor în combaterea bolilor și dăunătorilor, utilizarea lor pe scară largă, în doze mari și repetate provoacă numeroase inconveniențe de ordin ecologic, în special asupra solului, care este un factor important al mediului înconjurător, acesta fiind un suport fundamental pentru existența vieții. Aceste efecte pot fi de natură demoecologică, adică cele care afectează populațiile și în special densitatea acestora și de natură biocenotică – cele care provoacă rupturi ale echilibrelor biocenotice. Pentru a limita efectul de poluare a solului la USAMV Iași, s-a proiectat și realizat un echipament pentru a recupera o parte din substanța fitosanitară dispersată de către mașina de stropit TARAL 200 PITON TURBO, care nu a fost reținută de sistemul foliar al plantelor. Totodată, mașina de stropit în vii și livezi intensive a fost echipată cu duze cu absorbție de aer IDK 120-02 de la LECHLER, acestea putând reduce deriva picăturilor dispersate cu până la 90%.*

Cuvinte cheie: *duză, mașină de stropi, poluare, recuperare, sol.*

INTRODUCTION

Applying repeated treatments with pesticides to combat diseases and pests in vineyards and orchards, the number of 7-10 treatments and even more during a

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production cycle has a negative impact on the environment, particularly soil by its pollution (Arias-Estévez *et al.*, 2008).

Soil is the most important environmental factor because it is a "living organism". Soil is the heart of terrestrial ecosystems as a fundamental support for the existence of life on Earth Solul (Munteanu, 2005; Dumitru *et al.*, 2011). Soil is the main source of food supply for the world population, the main means of production vegetation, the main source of nutrients for plants and renewable energy resource main (Răuță and Cârstea, 1983).

The pollution, the soil changes the physical properties, chemical and biological repercussions of unwanted fertility (Munteanu, 2011). It is estimated that for the formation of a layer of soil 3 cm need 300-1000 years to 20 cm, 2000-7000 years, and 40 cm, 3000-12000 years. Therefore, once destroyed, the ground can be brought into the initial state after a long time (Cârstea, 2003). Pesticides in soil can be transferred without undergoing alterations plants, and fruit, animals and people (Jităreanu *et al.*, 2007; Țenu *et al.*, 2014).

Droplet size is confirmed as the most important factor of effective dispersal of pesticides. Evaluating the coverage has been of interest to plant more than 75 years (Ginsburg, 1928; Panneton. and Lacasse, 2003). Small droplets achieved better coverage of plants, but are subject to drift phenomenon. Chemical drift at the time of treatment is regarded as one of the contributors to environmental pollution and soil (Farooq *et al.*, 2001). It is accepted that more than 10% of the substance is lost through plant derived dispersed.

In the context of the above research and this paper sign, which studied the recovery of the substance dispersed sprayer În contextul cercetarilor TARAL 200 PITON TURBO using equipment designed for this purpose and using air suction nozzle to prevent drift.

MATERIAL AND METHOD

In order to reduce pollution of soil with pesticides while carrying out treatments of diseases and pests in vineyards, has designed and built a device that has mounted TARAL 200 PITON TURBO. This equipment recovered substance was not retained by vine leaves and vine would come via the ground polluting it.

This equipment consists of racks folded and curved polycarbonate panels fitted with gutters collecting plant substance (Fig.1). Thanks to this support with panels that straddles the one side of the rows of vines as a tunnel, these devices are called tunnel ramps.

The supports are adjustable hinged panels using a hydraulic cylinder in two positions work when they are placed on both sides of the rows of vines, and transportation or return the unit to their heads. The substance is recovered by panels plant and drained into gutters where it is absorbed pump spray machine returned to the tank.

The panels can be mounted on different distances from the axis of the spraying machine and at different heights from the ground with a tie.



Fig. 1 - Sprayer unit with equipment for recovering sprayed solution: 1 - car splashes; 2 - the metal frame; 3 - graduated cylinders; 4 - hydraulic cylinder; 5 - thrusts; 6 - collapsible support; 7 - parallelogram mechanism; 8 - rods; 9:12 - panels; 10 - pumps; 11 - gutters.

To determine the volume dispensed in a minute by the two spraying ramps, two flow meters were installed. To determine the volume recovered from the dispersed substance has been pumped into the second pot used for measuring by a measuring cylinder.

Experimental tests have been carried out under laboratory conditions, the tank is filled only with water. It was determined the recovery for one minute at different pressure (0.2; 0.4; 0.6; 0.8; 1.0; 1.2 and 1.4 MPa), distance from the axis of the panels spraying machine (1500, 1700, 1900 and 2100 mm) and their height above the ground (300, 500 and 700 mm). Axial fan speed was controlled to 1400 rev/min.

In order to reduce drift dispersed droplets have been mounted on the two ramps spraying the flat spray and air suction nozzle, IDK 120-02 from LECHLER. They carried large drops filled with air bubbles which are less influenced by drifting and performing an effective treatment because it is divided into fine droplets on the leaf.

RESULTS AND DISCUSSIONS

It appears that with increasing operating pressure the recovery of the substance (water) by two panels decreases the progression of recovery, the best values being obtained at a pressure of 0.2 MPa for all distances and heights for mounting the panels.

For a height of 300 mm from the ground recovering panels there is the greatest degree of recovery. This was achieved at a pressure of 0.2 MPa for panel mounting distance from the axis spraying machine 1500mm, being 75.61%. The recovery decreases with increasing distance from the mounting

of the panels to 72.93% from 65.37% to 1700 mm 2100 mm. Also for the other operating pressures, the recovery rate decreased with increasing distance. Under pressure from 1.2 to 1.4 MPa notes that the recovery is not reduced and stabilized, the pressure of 1.2 MPa to 38.89% being 1500 mm and 2100 mm 36.20% for and to 1.4 MPa being 39.46% to 36.20% 1500 mm and 2100 mm (Fig. 2).

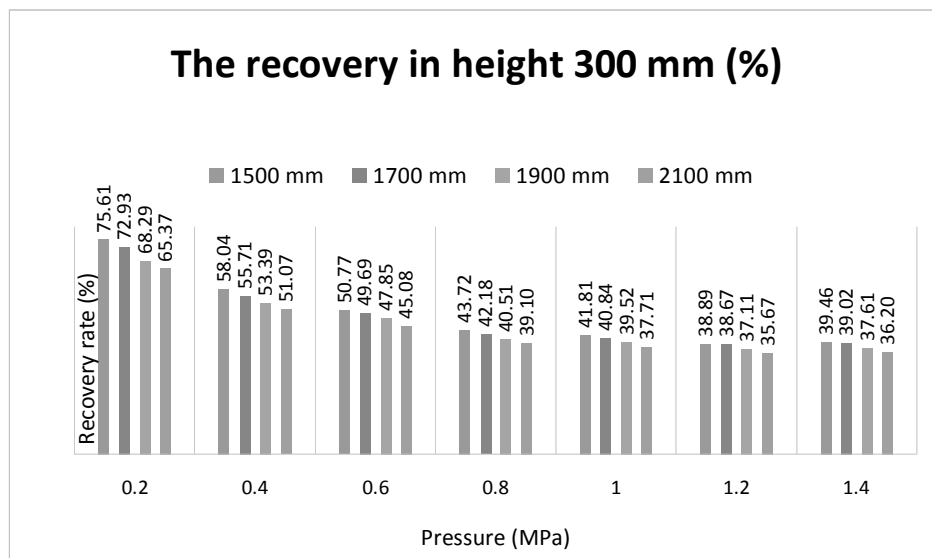


Fig. 2 - The recovery height of 300 mm from the ground recovering panels for their different distances from the axis of the spraying machine and different working pressures

And height of 500 mm is a decrease in the degree of recovery with increasing work pressure and distance arrangement of panels between 0.4 and 1.4 MPa pressure not great differences, the recovery is more stable. There is a decrease in recovery gradually to a height of 300 mm, pressure of 0.2 MPa from 75.61% to 41.22% of the distance of 1500 mm from 72.93 to 39.27% for 1700 mm, from 68.29 to 36.83% 1900 mm and from 65.37 to 32.93% 2100 mm (Fig. 3).

By increasing the height of the arrangement of the panels 700 mm is a decrease greater degree of recovery for the same operating parameters. Between 0.6 and 1.4 MPa pressure the recovery is also more stable. 0.2 MPa pressure is observed that the highest recovery rate is achieved at distances 1700 and 1900 mm, and 39.02% from 40.98 subtracting the distance of 1500 mm and 2100 to 37.07% mm to 31.95%. 0.4 and 0.6 MPa pressure is observed at higher recovery rate at a distance of 1700 mm, being 33.21 30% respectively, falling from distance to 1900 and then 1500 to 2100 mm (Fig. 4).

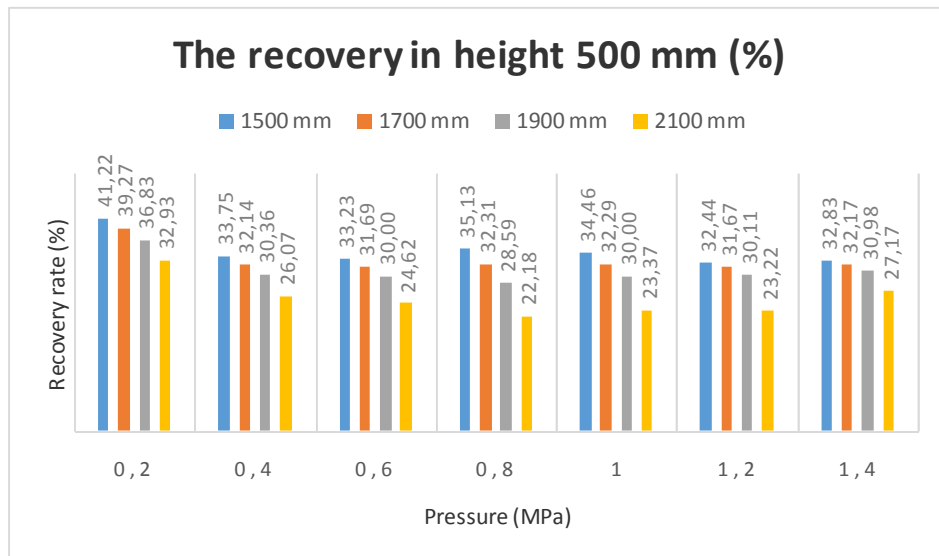


Fig. 3 - The recovery height of 500 mm from the ground recovering panels for their different distances from the axis of the spraying machine and different working pressures

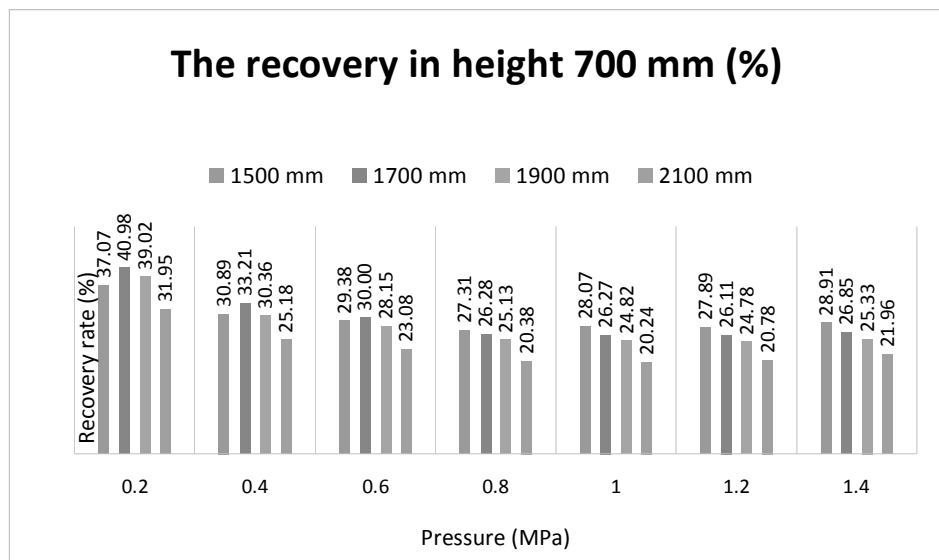


Fig. 4 - The recovery height of 700 mm from the ground recovering panels for their different distances from the axis of the spraying machine and different working pressures

CONCLUSIONS

1. The height of the layout of the panels affect the recovery rate, the more effective is the 300 mm, with a recovery rate of 75.61% for a pressure of 0.2 MPa at a distance of arrangement of the panel of 1500 mm.

2. Distance arrangement of the panels to the axis spraying machine also influences the recovery by increasing its droplet must travel a greater distance, with dwindling chances to get on the boards.

3. The pressure increase is observed that a recovery is obtained larger droplets influenced by derivatives.

4. Due to the air suction nozzle, the recovery rate is stable between 0.6 and 1.4 MPa pressure.

5. Equipment ramps tunnel to prevent soil pollution by recovering recycling plant substance dispersed.

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