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TRIALS AND RESULTS REGARDING CONTROL PRACTICES IN THE CROPS OF TWO YEAR-OLD OAK SAPLING, BY SPRAYING THREE NEIGHBOURING ROWS AT A PASSING, BY USING A DEFLECTING GRID

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Abstract
This paper deals with the results gathered from the control practices in the forestry nurseries on the two-year-old oak saplings, using portable spraying equipment (Stihl SR 420), when we sprayed three adjacent rows at a passage.
In the context of three rows sprayings, we determined the surface of the drops on a cm^2, the number of drops on a cm^2, the coverage percentage, the arithmetic mean of the number of drops on the eighteen sample markets and the total number of drops that fell on the top, the middle and the bottom of the sapling, both on the superior and inferior part of the leaf.

Keywords: oak saplings, three rows, deflecting grid, spraying.

AIMS AND BACKGROUND

Seeding on rows presupposes the incorporation of the seeds in little fosses called ditches, made on the crop surface. Thus, saplings spring in distanced rows and are arranged according to the adopted scheme. (Damian I. 1969)

In the case of strip grounds, the rows are placed at even distances of 30-40 cm, or grouped with intervals of 15-25 cm between the strap rows and 40-70 cm between straps in order to provide the possibility to use mechanized means. At the same density of crops expressed through the optimal number of saplings on a meter of row, the production index of the forestry nursery, that is the minimal number of saplings produced at hectare, can vary in large limits according to the crop scheme. The larger the crop scheme and allowing a greater degree of mechanization, the smaller is the total length of the rows on the hectare. Thus, the production index is more reduced. (Abrudan 2006)

When grouping the rows, we must take into consideration the requisitions of the cultivated species and the size of saplings. With broad-leaved trees, the strips chosen will be of maximum two rows in order to ensure a minim nutrition space for the sapling.

EXPERIMENTAL

The spraying was carried out in the forestry nursery of Iarac in the Forestry „Iuliu Moldovan", Sylvan District of Arad. The chosen species is the two-year-old oak, because the leaf surface is greater and we could place more easily the hydro-sensitive paper, and because of the infestation with the fungus *Microsphaera abbreviata*. (Boja F., Boja N., Teuşdea A., 2008)

Before using as active substance the fungicide Topas 100 EC, the experiment consisted in sample

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spraying with water to analyse the qualitative indices of the equipment Stihl SR 420.

The spraying was done as it follows: at a passing we sprayed three neighbouring rows, we placed six market samples placed from 5 to 5 m, resulting in 18 market samples.

By spraying three rows and using a deflecting grid, we determined the surface of the drops per cm^2, the number of the drops per cm^2, the the coverage percentage.

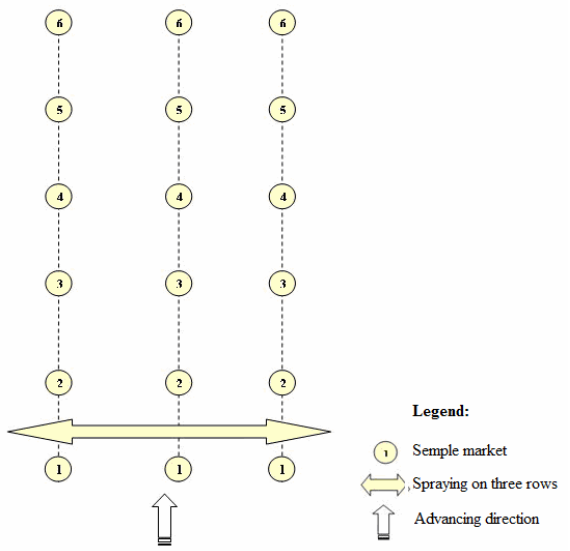

Fig 1. Placement modality of the sample markets while spraying on three rows

In each sample market, we chose a sapling on which we placed six samples of hydro-sensitive paper, at three levels: top of the sapling (a), middle part of the sapling (b) and inferior part of the sapling, at the bottom (c), close to the surface of the soil. The samples of hydro-sensitive paper have the dimensions of 76 x 13 mm and were placed on the leaves of the saplings through eye-letting, one on the superior surface of the leaf and one on the inferior side, along the main vein of the leaf.

We considered it necessary to place the hydro-sensitive paper on the inferior part of the leaf because very many pests are found in these places, hiding from the sun rays and being more numerous than those on the superior side of the leaf. (Boja F., Boja N., Sasu L., Darău A., Boja A., 2013)

RESULTS AND DISCUSSION

After carrying out every spraying, we collected the samples of hydro-sensitive papers, cleaned them of leaf remains or other dirt and packed them into hermetically-sealed bags.

It should also be added that with each type of spraying, we had to use polyethylene or rubber gloves for fixing and manipulating the hydro-sensitive paper samples so as to avoid their coloration and contamination. Another important aspect was that the collecting support (in our case, the leaves of the saplings), had to be dry; the hydro-sensitive paper samples should not be placed when the plants were still damp from dew or rain. The hydro-sensitive paper cards should not be removed as long as the leaves of the saplings are still damp. (Boja F., Boja N., Teuşdea A., 2009)

After spraying on three rows, there resulted 972 observation data that will be analysed.

Sprayings with a deflecting grid, three rows, first discharge step

Table 1

Indices	Position	Position of the leaf on the sapling no. 1			Position of the leaf on the sapling no. 2			Position of the leaf on the sapling no. 3		
		Top	Middle	Bottom	Top	Middle	Bottom	Top	Middle	Bottom
Market sample 1										
Surface of drops/cm^2 (mm^2)	Superior side of the leaf	0,003	0,007	0,005	0,009	0,001	0,009	0,011	0,001	0,010
	Inferior side of the leaf	0,011	0,003	0,007	0,007	0,007	0,002	0,004	0,009	0,003
Number of drops/cm^2 (pieces)	Superior side of the leaf	6	10	14	20	2	25	19	1	17
	Inferior side of the leaf	14	5	3	19	2	1	6	6	2
Overage percentage (%)	Superior side of the leaf	0,30	0,70	0,52	0,92	0,11	0,89	1,06	0,10	0,99
	Inferior side of the leaf	1,14	0,30	0,70	0,72	0,66	0,19	0,36	0,93	0,34

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Sprayings with a deflecting grid, three rows, third discharge step

Table 2

Indices	Position	Position of the leaf on the sapling no. 1			Position of the leaf on the sapling no. 2			Position of the leaf on the sapling no. 3		
		Top	Middle	Bottom	Top	Middle	Bottom	Top	Middle	Bottom
Market sample 3										
Surface of drops/cm² (mm²)	Superior side of the leaf	0,033	0,007	0,047	0,473	0,222	0,008	0,614	0,006	0,003
	Inferior side of the leaf	0,055	0,006	0,003	0,021	0,013	0,014	0,100	0,002	0,001
Number of drops/cm² (pieces)	Superior side of the leaf	42	17	89	33	154	13	36	10	10
	Inferior side of the leaf	131	11	4	55	41	16	80	6	1
Overage percentage (%)	Superior side of the leaf	3,25	0,68	4,71	47,34	22,19	0,75	61,43	0,59	0,30
	Inferior side of the leaf	5,49	0,58	0,28	2,09	1,31	1,43	9,96	0,19	0,08

Sprayings with a deflecting grid, three rows, sixth discharge step

Table 3

Indices	Position	Position of the leaf on the sapling no. 1			Position of the leaf on the sapling no. 2			Position of the leaf on the sapling no. 3		
		Top	Middle	Bottom	Top	Middle	Bottom	Top	Middle	Bottom
Market sample 6										
Surface of drops/cm² (mm²)	Superior side of the leaf	0,709	0,027	0,014	0,550	0,030	0,013	0,284	0,048	0,025
	Inferior side of the leaf	0,065	0,015	0,000	0,022	0,006	0,009	0,075	0,068	0,020
Number of drops/cm² (pieces)	Superior side of the leaf	7	42	27	39	49	33	94	56	41
	Inferior side of the leaf	72	32	0	57	12	8	107	24	22
Overage percentage (%)	Superior side of the leaf	70,93	2,74	1,41	54,92	3,01	1,35	28,38	4,76	2,53
	Inferior side of the leaf	6,52	1,50	-	2,16	0,60	0,93	7,53	6,76	2,05

Average number of drops per cm² while spraying on three rows

Spraying with a deflecting grid , first discharge step

Table 4

Average number of drops per cm²	Position of the leaf on the sapling no. 1			Position of the leaf on the sapling no. 2			Position of the leaf on the sapling no. 3		
	Top	Middle	Bottom	Top	Middle	Bottom	Top	Middle	Bottom
Superior side of the leaf	7	10	8	29	9	13	17	12	10
Inferior side of the leaf	9	14	1	19	7	8	8	17	2

Spraying with a deflecting grid , three discharge step

Table 5

Average number of drops per cm²	Position of the leaf on the sapling no. 1			Position of the leaf on the sapling no. 2			Position of the leaf on the sapling no. 3		
				Top	Middle	Bottom	Top	Middle	Bottom
Superior side of the leaf	45	41	78	87	97	39	85	60	16
Inferior side of the leaf	57	22	7	77	16	30	97	14	11

Spraying with a deflecting grid , six discharge step

Table 6

Average number of drops per cm²	Position of the leaf on the sapling no. 1			Position of the leaf on the sapling no. 2			Position of the leaf on the sapling no. 3		
	Top	Middle	Bottom	Top	Middle	Bottom	Top	Middle	Bottom
Superior side of the leaf	45	86	49	43	78	52	42	69	75
Inferior side of the leaf	65	25	2	74	43	19	77	21	19

Figure 2. Distribution of the average number of drops/cm² in the case of three-row spraying with a deflecting grid and a first discharge step

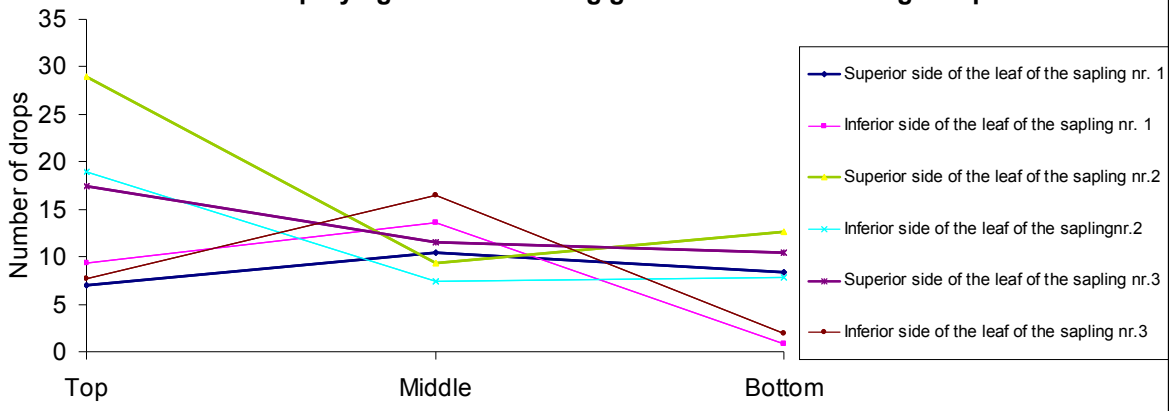


Figure 3. Distribution of the average number of drops/cm² in the case of three-row spraying with a deflecting grid and a third discharge step

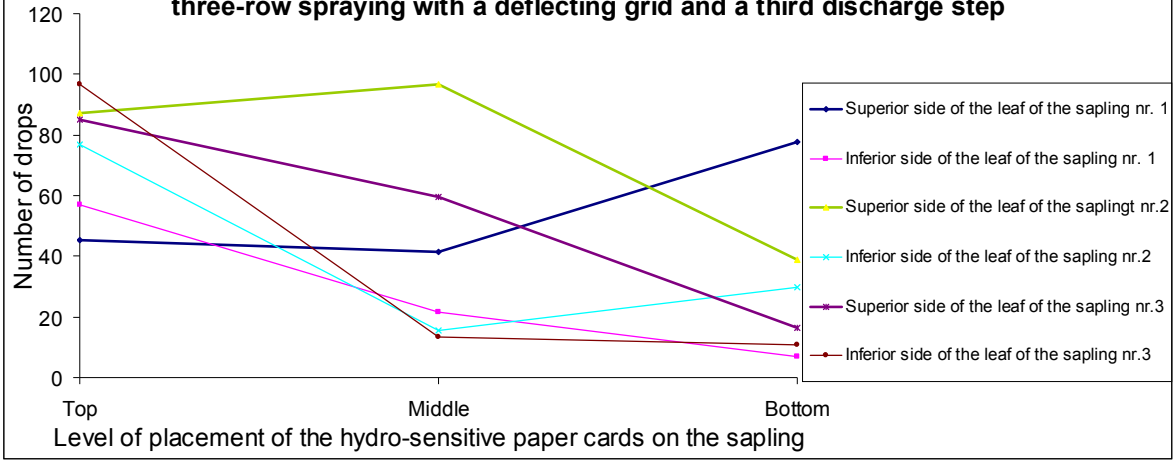
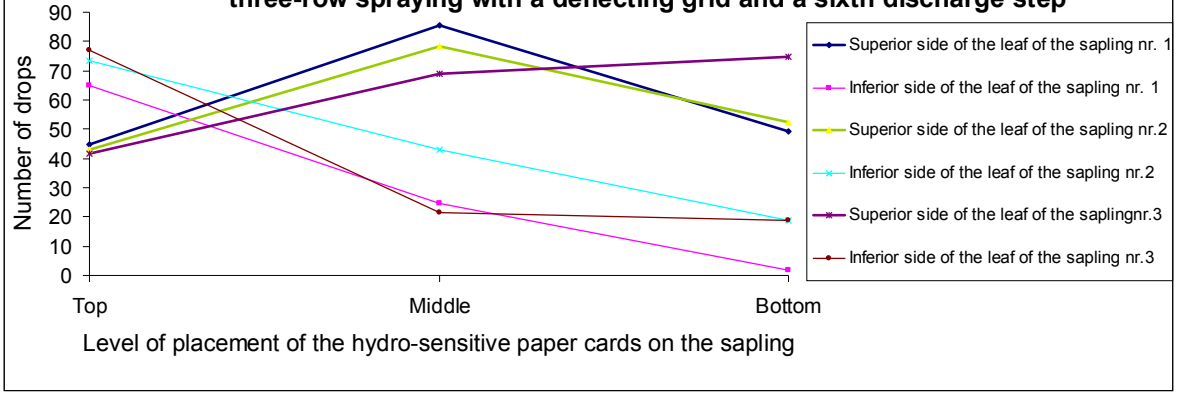


Figure 4. Distribution of the average number of drops/cm² in the case of three-row spraying with a deflecting grid and a sixth discharge step



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In order to quantify the correlational dependence between the distribution of the average number of drops/cm^2 in strict connection with the discharge step and the type of grid employed, we determined the regression equations, whose values appear in table 10 to which we also added the value of the coefficient of determination R^2.

Table 10 Regression equations for the distribution of the number of drops before reaching the top and bottom of leaves using different types of grids and step flow

No. of rows sprayed	Type of grid	Discharge step	Position of the leaf	Regression equation	R^2	Correlation coefficient, r
3	Deflecting	1	Superior side of the leaf of the sapling no. 1	y = 0,6465x + 7,2951	0,1503	0,388
			Inferior side of the leaf of the sapling no. 1	y = -4,2842x + 16,489	0,4275	0,654
			Superior side of the leaf of the sapling no. 2	y = -8,2223x + 33,39	0,6045	0,777
			Inferior side of the leaf of the sapling no. 2	y = -5,5506x + 22,523	0,7202	0,849
			Superior side of the leaf of the sapling no. 3	y = -3,518x + 20,151	0,8662	0,931
			Inferior side of the leaf of the sapling no. 3	y = -2,8591x + 14,452	0,1529	0,391
		3	Superior side of the leaf of the sapling no. 1	y = 16,245x + 22,286	0,6618	0,814
			Inferior side of the leaf of the sapling no. 1	y = -25,126x + 78,742	0,9493	**0,974**
			Superior side of the leaf of the sapling no. 2	y = -24,157x + 122,4	0,6055	0,778
			Inferior side of the leaf of the sapling no. 2	y = -23,531x + 87,723	0,5389	0,734
			Superior side of the leaf of the sapling no. 3	Y = -34,484x + 122,68	0,9781	**0,989**
			Inferior side of the leaf of the sapling no. 3	y = -42,888x + 126,06	0,7745	0,880
		6	Superior side of the leaf of the sapling no. 1	y = 2,2158x + 55,426	0,0098	0,099
			Inferior side of the leaf of the sapling no. 1	y = -31,5x + 93,48	0,9761	**0,988**
			Superior side of the leaf of the sapling no. 2	y = 4,6667x + 48,516	0,0648	0,255
			Inferior side of the leaf of the sapling no. 2	y = -27,41x + 100,03	0,9958	**0,998**
			Superior side of the leaf of the sapling no. 3	y = 16,48x + 28,726	0,8782	**0,937**
			Inferior side of the leaf of the sapling no. 3	y = -29,07x + 97,354	0,7813	0,884

According to the recommendations of the manufacturers of this type of equipment, positive values are considered to be when the number of drops is 70-80 drops/cm^2. At the same time, negative values are considered to be when the number of drops is under 70 drops/cm^2.

CONCLUSIONS

By analysing the three-row spraying we inferred the following partial conclusions:

- Using gear one, flow rate values obtained were relatively weak, with no samples to be within tolerances.
- In gear six of the spraying equipment, there were samples with positive values at the top and the middle of the saplings, which are arranged two each in the side sapling both the upper and on the bottom face of the leaf.

In conclusion, we presented these samples that we considered positive from the points of view of the number of drops/cm^2 and the coverage percentage in the table below:

Table 11 Total number of cards with positive values at three-row spraying

Type of spraying	Discharge step	Hydro-sensitive paper cards which fit in the admitted tolerance from the point of view of number of drops/cm^2	Hydro-sensitive paper cards which fit in the admitted tolerance from the point of view of the coverage percentage (5-20 %)
Three-row spraying deflecting grid	T_1	2	1
	T_3	30	18
	T_6	**33**	**38**

Considering the work method for the determination of the size of the drops, on each spraying type, we have tried and experimented in lab and field conditions so that we could devise a counting algorithm in order to determine the number of drops and, implicitly, the size of the drops on the basis of the image analysis.

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