STUDIA UNIVERSITATIS "VASILE GOLDIŞ" ARAD
SERIA ŞTIINŢE INGINEREŞTI ŞI AGRO-TURISM

May 2014 Vol.9 Iss.1 pp.33-39
http://studia.facultateadeinginerie.ro
"Vasile Goldiş" University Press

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 CONICAL GRID

Florinel Boja, Nicusor Boja, Adina Boja

"Vasile Goldiş" Western University of Arad

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 CONICAL GRID

Florinel Boja[1*]
Nicusor Boja[1]
Adina Boja[2]

[1] **Department of Forestry and Agrotourism, Faculty of Natural Sciences, Engineering and Informatics**, "Vasile Goldiş" Western University of Arad, Liviu Rebreanu 86, 310426, Arad, Romania
[2] **"Vasile Goldiş"Particular** College, Feleacului 1, Arad Romania

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, conical grid.

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-

* Author to whom all correspondence should de addressed: e-mail: bojaflorin@yahoo.com

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 CONICAL GRID

Florinel Boja, Nicusor Boja, Adina Boja

"Vasile Goldiş" Western University of Arad

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., Teușdea A., 2008)

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

(Figure 1)

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

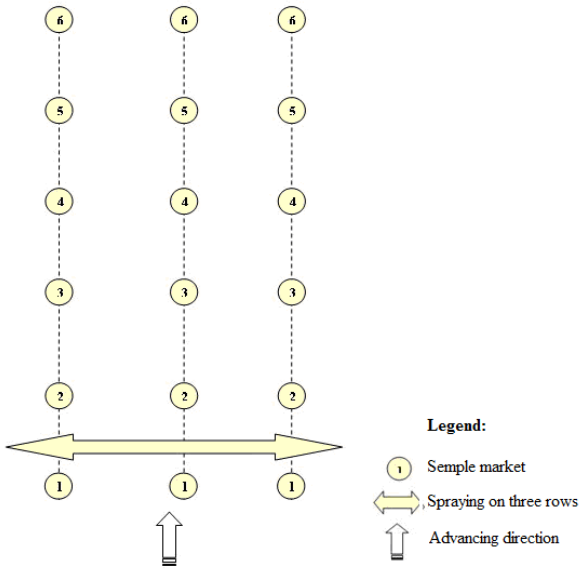

Figure 1. Placement modality of the sample markets while spraying on three rows

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., Teușdea A., 2009)

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

Table 1 **Sprayings with a conical grid, three rows, first discharge step**

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	0,002	0,004	0,002	0,009	0,002	0,003	0,005	0,006	0,016
	Inferior side of the leaf	0,002	0,005	0,000	0,001	0,000	0,000	0,008	0,000	0,033
Number of drops/cm^2 (pieces)	Superior side of the leaf	1	2	4	2	3	3	11	16	49
	Inferior side of the leaf	1	4	0	2	0	0	27	0	33
Overage percentage (%)	Superior side of the leaf	0,21	0,36	0,16	0,89	0,22	0,31	0,46	0,61	1,58
	Inferior side of the leaf	0,18	0,48	-	0,06	-	-	0,79	-	3,30

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 CONICAL GRID

Florinel Boja, Nicusor Boja, Adina Boja

"Vasile Goldiş" Western University of Arad

Sprayings with a conical 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	0,007	0,003	0,002	0,110	0,022	0,010	0,185	0,025	0,002
	Inferior side of the leaf	0,024	0,000	0,000	0,001	0,243	0,000	0,298	0,005	0,001
Number of drops/cm² (pieces)	Superior side of the leaf	16	17	2	148	29	22	71	39	5
	Inferior side of the leaf	49	0	0	1	86	0	60	14	1
Overage percentage (%)	Superior side of the leaf	0,66	0,68	0,21	10,99	2,17	0,99	18,51	2,50	0,18
	Inferior side of the leaf	2,42	0,02	0,02	0,12	24,31	-	29,76	0,46	0,06

Sprayings with a conical 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	0,551	0,010	0,019	0,143	0,058	0,027	0,607	0,040	0,015
	Inferior side of the leaf	0,081	0,016	0,000	0,559	0,032	0,003	0,038	0,003	0,027
Number of drops/cm² (pieces)	Superior side of the leaf	10	14	19	36	84	27	12	87	27
	Inferior side of the leaf	43	11	1	4	14	2	49	6	12
Overage percentage (%)	Superior side of the leaf	55,15	0,97	1,92	14,27	5,81	2,68	60,73	4,00	1,48
	Inferior side of the leaf	8,13	1,61	0,04	55,95	3,17	0,27	3,79	0,34	2,69

Average number of drops per cm^2 while spraying on three rows

Spraying with a conical 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	8	14	1	20	8	11	14	16	13
Inferior side of the leaf	6	2	0	13	1	0	16	0	6

Spraying with a conical 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	38	30	25	96	48	44	85	41	60
Inferior side of the leaf	35	2	3	18	20	3	53	54	3

Spraying with a conical 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	46	47	37	45	59	53	64	53	72
Inferior side of the leaf	41	8	5	13	15	9	47	36	11

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

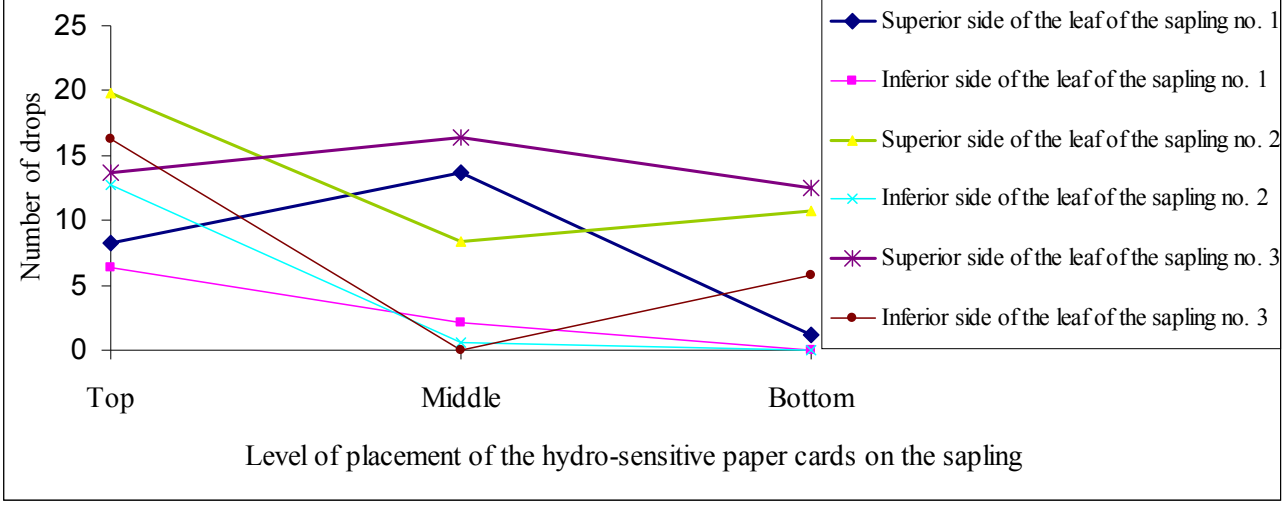

Figure 3. Distribution of the average number of drops/cm^2 in the case of three-row spraying with a conical grid and a third discharge step

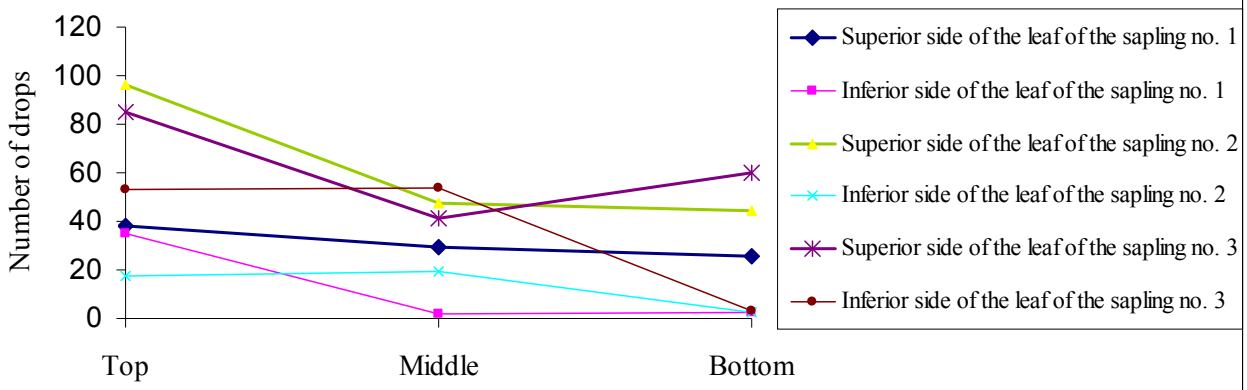

Figure 4. Distribution of the average number of drops/cm^2 in the case of three-row spraying with a conical grid and a sixth discharge step

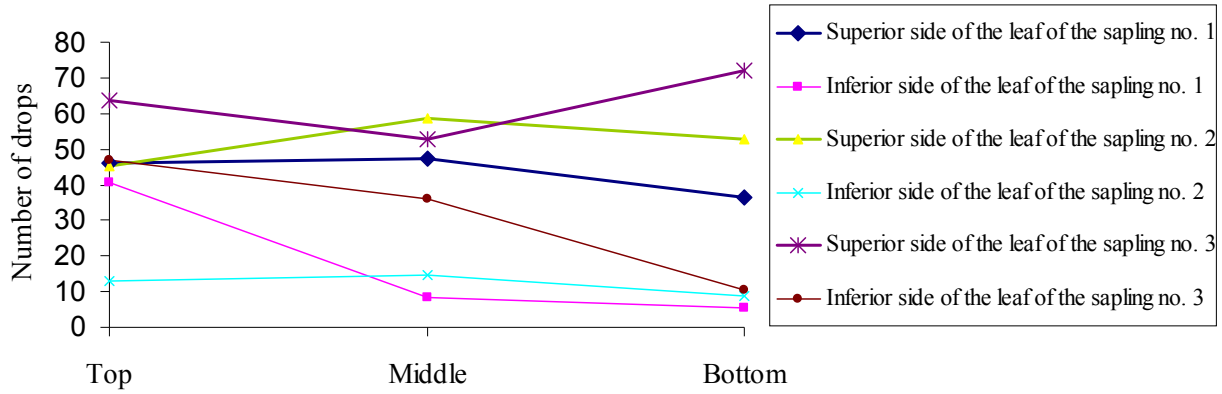

Table 7 **Repartition of the total number of drops per cm2 from the six sample markets after the spraying on three rows, by using the conical grid at the first discharge step**

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
Superior side of the leaf	50	82	7	119	50	64	82	99	75
Inferior side of the leaf	38	13	0	76	4	0	97	0	35

Table 8 **Repartition of the total number of drops per cm2 from the six sample markets after the spraying on three rows, by using the conical grid at the third discharge step**

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
Superior side of the leaf	229	178	152	578	285	267	510	247	360
Inferior side of the leaf	210	10	17	106	118	15	320	324	18

Table 9 **Repartition of the total number of drops per cm2 from the six sample markets after the spraying on three rows, by using the conical grid at the sixth discharge step**

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
Superior side of the leaf	277	284	219	270	352	317	382	316	433
Inferior side of the leaf	243	50	32	77	89	53	282	217	64

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.

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

Table 10

No. of rows sprayed	Type of grid	Discharge step	Position of the leaf	Regression equation	R^2	Correlation coefficient, r
3	Conical	1	Superior side of the leaf of the sapling no.1	y = -3,5888x + 14,884	0,3241	0,569
			Inferior side of the leaf of the sapling no.1	y = -3,1606x + 9,1294	0,9641	0,982
			Superior side of the leaf of the sapling no.2	y = -4,523x + 21,995	0,5659	0,752
			Inferior side of the leaf of the sapling no.2	y = -6,3467x + 17,129	0,7861	0,887
			Superior side of the leaf of the sapling no.3	y = -0,5494x + 15,301	0,0758	0,275
			Inferior side of the leaf of the sapling no.3	y = -5,2422x + 17,823	0,4049	0,636
		3	Superior side of the leaf of the sapling no.1	y = -6,383x + 43,824	0,9648	0,982
			Inferior side of the leaf of the sapling no.1	y = -16,164x + 45,516	0,7264	0,852
			Superior side of the leaf of the sapling no.2	y = -25,972x + 114,75	0,7944	0,891
			Inferior side of the leaf of the sapling no.2	y = -7,5588x + 28,377	0,6522	0,808
			Superior side of the leaf of the sapling no.3	y = -12,461x + 86,987	0,3211	0,567
			Inferior side of the leaf of the sapling no.3	y = -25,14x + 87,055	0,7385	0,859
		6	Superior side of the leaf of the sapling no.1	y = -4,8113x + 52,982	0,6614	0,813
			Inferior side of the leaf of the sapling no.1	y = -17,641x + 53,367	0,8159	0,903
			Superior side of the leaf of the sapling no.2	y = 3,9266x + 44,33	0,3323	0,576
			Inferior side of the leaf of the sapling no.2	y = -1,993x + 16,163	0,4259	0,653
			Superior side of the leaf of the sapling no.3	y = 4,2599x + 54,325	0,1888	0,435
			Inferior side of the leaf of the sapling no.3	y = -18,203x + 67,719	0,9483	0,974

From the analysis of the values of the coefficient of determination in relation with the position of hydro-sensitive paper samples on the leaves of the saplings, we can infer the following observations:

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 CONICAL GRID

Florinel Boja, Nicusor Boja, Adina Boja

"Vasile Goldiş" Western University of Arad

◊We detected a diminution of the vertical distribution of the average number of drops sedimented on the hydro-sensitive paper cards at all discarge steps. This finding can be explained by the way in which the pulverizing tube of the equipment is manoeuvred, trying to spray the three rows at a passing and to respect the work speed .

◊The results that we appreciated as being positive were registered also in the case in which the device is equipped with a conical grid and used at the third discharge step. This means that when working at an average discharge step we can obtain a uniform distribution of the number of drops at all three levels.

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:

When spraying the three rows simultaenously, the average number of drops/cm^2 lowered at all samples at every discharge step.

As the total number of drops/cm^2 is concerned, we noticed a slight uniformity of the values on the six market samples at the third and sixth discharge steps on all of the three neighbouring saplings.

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:

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

Table 11

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 conical grid	T_1	0	2
	T_3	24	17
	T_6	17	29

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.

REFERENCES

Abrudan I.V.,2006, Afforestation, University Transilvania Brasov.

Boja F., Boja N., Teuşdea A., 2008: Trying and issues concerning the fitosanitary treatments, with perfectionate disposable with spraying, Scientific papers faculty of agriculture: International symposium trends in European agriculture development, Editura Agroprint, Timişoara, Vol 40 (1) pag. 349-357.

Boja F., Boja N., Teuşdea A., 2009: The decrease of the polluting effect on the environment through the usage of modern sprayers, MANAGEMENT AND SUSTAINABLE PROTECTION OF ENVIRONMENT, INTERNATIONAL U.A.B. -B.E.n.A CONFERENCE, 2009.

Boja F., Boja N., Sasu L., Darău A., Boja A., 2013: Results of spraying on a row in forestry nurseries using modern portable spraying appliances, Engineering Sciences and Agroturism Series vol.8, issue 2, „Vasile Goldis" Western University of Arad, p19-25.

Damian, I., 1969 Afforestation, Didactic and Pedagogical Bucharest; p.155-170