THE RELATION BETWEEN THE DIAMETER OF THE STALK AND THE HEIGHT AT THE SPECIES OF GREYISH OAK INSTALLED ON LANDS WHICH ARE UNSUITABLE FOR AGRICULTURE AND SITUATED ON THE HILLS OF TULCEA (NORTHERN DOBROGEA)

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Abstract

At O.S.Babadag in U.P.IV Heracleea u.a. 94A there has been artificially installed in forestry cultures the greyish oak associated with different species of arbutuses. From the associations there resulted four variants. By means of regression equations it was observed the relation between the growth in height of the greyish oak seedlings and the diameter of the stalk.

The reading of the data highlighted that the growth in heights of the greyish oak seedlings and the growth of the diameter of the stalk is influenced by the pairing mode of this species with species of arbutuses.

Key words: regression equations, the growth in height and the growth of the diameter of the stalk.

INTRODUCTION

One of the important goals of forestry in our country is the expansion of the forested areas in which, on one hand, artificially new forest ecosystems are installed and on the other hand the surface of the forest, which in the last few years had decreased considerably, is increased.

Dobrogea is one of the regions most heavily exposed to drought and aridisation, and at the same time, not incidentally, has the weakest degree of afforestation in the country. In these conditions, increasing the area covered by forest and the application of integrated measures to combat drought and land degradation is part of the national strategy for the prevention and control of these processes.

In 2002 through HG.357, 281 ha of lands, that were unsuitable for agriculture, were taken from ADS. This area was established in the improvement area of T.D. Agighiol being taken from agricultural sector and given for administration to Directia Silvica Tulcea through Ocolul Silvic Babadag.

Installation of forest vegetation on the land in question haS been done by planting seedlings on the land for forest using differentiated technologies

according to the areas conditions and bioecological particularities of the forest species.

MATERIALS AND METHODS

In order to achieve the proposed objective it has been chosen as study area the plantations established in u.a.93A, from U.P.IV Heracleea, O.S.Babadag of Directia Silvică Tulcea.

The study realised in T.D. Agighiol improvement perimeter sought the growth and development manner of the greyish oak specimens planted in strips of two rows each and bordered laterally by one row from a species of arbutus specific for the studied zone.

The seedlings have been planted in prepared soil, the preparing of the ground being done on the entire surface by ploughing in two perpendicular directions. The installing of the cultures was done in autumn 2003 with seedlings coming from our own nursery and planted in the same period. The planting of the seedlings has been done in holes of 30x30x30 cm, at the pattern of 2x1 m, with a density of 5000 pieces per ha. The next works of filling the gapes were done in the autumn in the first three years from the plantation, after the yearly control of the regeneration. The maintenance works of the cultures were done at the optimum moment, by hand on the rows of seedlings and mechanised with the plough between the rows; in the first three years there were performed three hoes per year, in the fourth and the fifth year there were performed two hoes per year and in the sixth year a hoe per year and only on the oak rows because the arbutuses species were very well developed.

The works on the ground started in the autumn of 2009 when there have been installed four experimental parcels with 100mp each, for every studied variant. In 2009, for the third studied variant and which encompassed two oak rows bordered with oleaster, it was made at the oleaster species a silvotechnic work of equalization meaning that there were cut the lateral branches which overwhelmed or whipped the greyish oak specimens.

For the quantification of the growth and the development of the greyish oak seedlings cultivated in strips of two rows each and bordered with arbutus species, all the seedlings were inventoried in order to determinate the percentage of maintaining then, at these seedlings, there was measured the diameter of the stalk and their height. For measuring the height it was used a tape measure in centimetres and for the measurements of the diameter of the stalk it was used a calliper.

As a way of working there has been taken into account four variants of association of the main species of greyish oak with the secondary species represented of arbutus species of: rosehip, hawthorn, pruned oleaster and

unpruned oleaster. All the studied variants and the description of the taken into account parcel are presented in table 1.

Foto1.Greyish oak and rosehip rows   Foto2. Greyish oak and pruned oleasterrows

The actual measurements were done in the autumn of 2011 when the plantation had the age of 8 years, measurements which have been collected on the field and centralized at the office.

Table 1.
The repartition of the analysed variants based on the types of arbutus

Nr. Crt.	The production unit	Variant	The arrangement unit	Area (ha)	Composition	Age	Incl (G)
1	IV	I	93A	41,64	50Gr.oak50Rosehip	8	4
2	IV	II	93A	41,64	50Gr.oak50Howthorn	8	5
3	IV	III	93A	41,64	50Gr.oak50Oleaster*	8	4
4	IV	IV	93A	41,64	50Gr.oak50Oleaster	8	4

*- pruned oleaster;

RESULTS AND DISSCUSIONS

The results of the study (measurement, count) have been registered as they have been determined in field files and for simplifying the dimension of the table, the primary data have been analysed on the computer at the office using Excel. After the measurements there has been determined the growth of the stalk after eight years of vegetation recorded in height and diameter on the greyish oak specimens on the installed test parcels.

The primary data for each variant which were based on the two determined characteristics (the diameter of the stalk and the height of the species) have been interpreted statistically.

Regression equations. By representing graphically all the recorded values there have been obtained the corresponding correlation fields (statistic clouds) Fig.1, Fig.2, Fig.3 and Fig.4.

Fig.1   Fig.2

Fig.3   Fig.4

We shall refer further, only to the situation of the simple regression (a dependant and an independent variable) and linear (the relation between the two variables may be described by a straight line in the cloud of points). The regression is very much related to the concept of correlation. A strong association between two elements leads to the raising of the precision of a prediction of a variable on behalf of another. If we had a perfect correlation ($+1$ or -1) the estimation would be very precise.

In this respect it has been calculated the regression equation for the relationship between the measured growth in height and the diameter of the stalk of the greyish oak seedlings for the four studied variants. The analysed equation of regression was the linear one obtaining the value of the determination coefficient r^2 (Fig.1, Fig.2, Fig.3 and Fig.4).

These are the obtained equations for:

V_1. The relation growth in height-diameter of the stalk:

$H = 23.602dc + 91.379$, $R^2=0,461$

V_2. The relation growth in height-diameter of the stalk:

$H = 21.163dc + 101.21$, $R^2=0,283$

V_3. The relation growth in height-diameter of the stalk:

$H = 40.955dc + 36.344$, $R^2=0,94$

V_4. The relation growth in height-diameter of the stalk:

$H = 40.905dc + 35.489$, $R^2=0,64$

In which:

H represents the growth in height in cm;

dc- the diameter of the stalk in mm;

The angular coefficients of the regression right lines are equivalent with their slant and indicate the fact that the bigger is the growth of the dependent variable, the more significant is the growth of the independent value.

b. Correlations.

The correlation coefficient represents the intensity of the connections between two variables. The correlation coefficient varies between 0 and ±1, thus the closer of 1 or -1 is the value of the correlation coefficient the less is the spreading degree. The determination of the signification of the correlation coefficient has been done with the help of the **u test** and using Fisher's transformation. $U=r/s_r$

For **u** calculated for the four variants one can obtain the values presented in Table 2 and they are bigger than the theoretical values for a probability of transgression of 0,01.

Table 2

The values of the variation coefficients

The correlation coefficient	Number of the observed values
0,68	71
0,53	70
0,93	70
0,80	68

In order to verify the four correlation coefficients, if there are estimations of the same theoretic correlation coefficient it was calculated $\chi^2_{exp} = 49,31$.

For a probability of transgression of 0,05 (Giurgiu V.,1972), $\chi^2 = 7,81$, so the calculated value is bigger than the value from the table, there is no basis to be accepted the supposition that the four empiric correlation coefficients are estimations of the same theoretic correlation coefficients .

1.V_3 for r=0,93 there is a significant signification up against the other variants;

2.V_2 for r=0,8 there is a significant signification up against the variants 1 and 2;

3.For the variants 1 and 2 it has been established a $\bar{r}$ =0,609;

The assessing of the signification has been done with a probability of transgression of 0, 05%.

CONCLUSIONS

In the forestry cultures, the greyish oak species have been rarely introduced in unmixed plantations; in the majority of the cases there have been introduced in compositions of afforestation in which the participation of that species was percentual. Through the prosecuted research it has been observed the manner of developing of the greyish oak species alternated with different arbutus species.

After the full inventory of the trees and the analyse of the primary data in statistic indicators there have been obtained values which permitted to be confirmed the fact that the growth in height of the greyish oak seedlings and the growth in diameter of the stalk is influenced by the manner of association of this species with arbutus species.

In order to help this practice it was established on the basis of the statistics the fact that the arbutus species stimulate the growth in height of the greyish oak.

The technological solution is to plant the greyish oak seedlings in association with arbutus species which grow fast and to conduct them through forestry works till the realisation of the proportion of proximity of the treetops of over 70%.

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