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***JUNIPERUS* L.**

( *.communis* L., *.oxycedrus* L. *.sibirica* Burgsdorf.)

, 2012.



## ABSTRACT

This doctoral thesis aimed to explore the variety of anatomical and morphological characteristics of three different juniper species (*Juniperus communis*, *Juniperus oxycedrus* and *Juniperus sibirica*) from the area of Kopaonik mountain. Analysis specimen for the species *Juniperus communis* and *Juniperus oxycedrus* were collected from the altitude of 420, 620, 820, 1020, 1220 and 1420 meters and for *Juniperus sibirica* from 2100 meters. The results of anatomical and morphological characters of each juniper species have been statistically processed.

Applying suitable univariant and multivariant statistic methods the level of the variety of the anatomic and morphological characters have been identified both between different species and among specimen of the same species from the different altitudes. It was find out that when altitude is changed the anatomical and morphological characters of the leaves are changed too, both to *Juniperus communis* and *Juniperus oxycedrus* species.

The obtained results of univariant statistical analysis showed that all three types of juniper from the studied areas have a value of anatomical and morphological characters that are consistent with the literature data. With the altitude rise species *Juniperus communis* and *Juniperus oxycedrus* have leaf length continuously reduced until the width and thickness of leaves is increased. *Juniperus sibirica* in relation to the other two types of juniper has a short, lean and thin leaves.

When it comes to anatomical characters of the leaves, descriptive statistics showed that they change with increasing altitude. Although there is a slight trend of increase of the cuticle and epidermis thickness on the both sides of the leaves with altitude increased, it was found that their greatest thickness was recorded on altitude of 620 meters. The highest values for height and width of the epidermis were established on them. The fact that the leaves of juniper *Juniperus communis* and *Juniperus oxycedrus* are the best adapted to ecological conditions on habitat is confirmed by the highest values of resinous channels length as well as the length and width of conducting fascicles. Species *Juniperus sibirica* has much shorter and narrower conducting fascicle, while the value of it's other anatomical characters within the limits of the other two types of juniper.

Analysis of variance (ANOVA) showed that there are significant differences in anatomic characters of the leaves *Juniperus communis* and *Juniperus oxycedrus* that were collected on the various altitudes.

Discrimination canonical analysis of leaves anatomical characters of species *Juniperus communis* and *Juniperus oxycedrus* indicated that discrimination in the first three axes is contributed the most by epidermal characters. Analysis of graphics centroids position in the area of first and second canonical axis clearly separates the sample from 620 meters altitude, which is in accordance with the results of descriptive statistics. UPGMA cluster analysis method also confirmed this deviation.

|              |                                                                                                 |            |
|--------------|-------------------------------------------------------------------------------------------------|------------|
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# 1.

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( , 1995).



( , 2001).

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0.5 ° ( , 1950).

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0,58 ,

11,5

100 .





(Killian Lemee, 1956; Larcher, 1995; Oppenheimer, 1960; Stocker, 1947; Tuner, 1986)

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(Fahn i Cutler, 1992).

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- *Juniperus*, ( ,

), *Juniperus oxycedrus*, *Juniperus communis* i

*Juniperus sibirica*,

( - , 1959)

( , 1995).

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( ., 2008; ., 2010;

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( , 1987).

( , 1953; , 1963; , 1995),

( , 1969).

( , „ , „ . . 1996)

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(Billings, 1970; Hantemirov ., 2000), ( , „ , „ , „

1996),  
( , „ , .1996).

1996) (Chatterjee „, 1993;

, 1994; Morris „, 1970; Stassi „, 1996),

(Garcia de la Serana „, 1984).

( , 1976), 1

30

(Clarke, 1959; Lemoine-

Sebastian, 1965; , 1996; y , 1949)

*Juniperi aetheroieum*

( , 1997).

(Adams, 1991; Adams, 1998; Adams i sar., 1999; Caramiello i sar., 1995;

Chatzopoulou i Katsiotis, 1994; , 1985; y, 1993; , 1983;

„, 1994; „, ( .); . 1997).

(Achary-PMR, 1993; „,1996; Chatterjee-TK; Ghosh-CM; Mukherjee-

K; „, „, „, .1996).

*Juniperus communis*, *Juniperus oxycedrus* *Juniperus*

*sibirica*

(*Juniperus communis* *Juniperus oxycedrus*)

420 1420 , , *Juniperus sibirica*,

o 2100 . *Juniperus communis*

*Juniperus oxycedrus*

1420

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*Juniperus*

*communis*, *Juniperus oxycedrus* i *Juniperus sibirica*

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## 2.

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### 2.1.

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82

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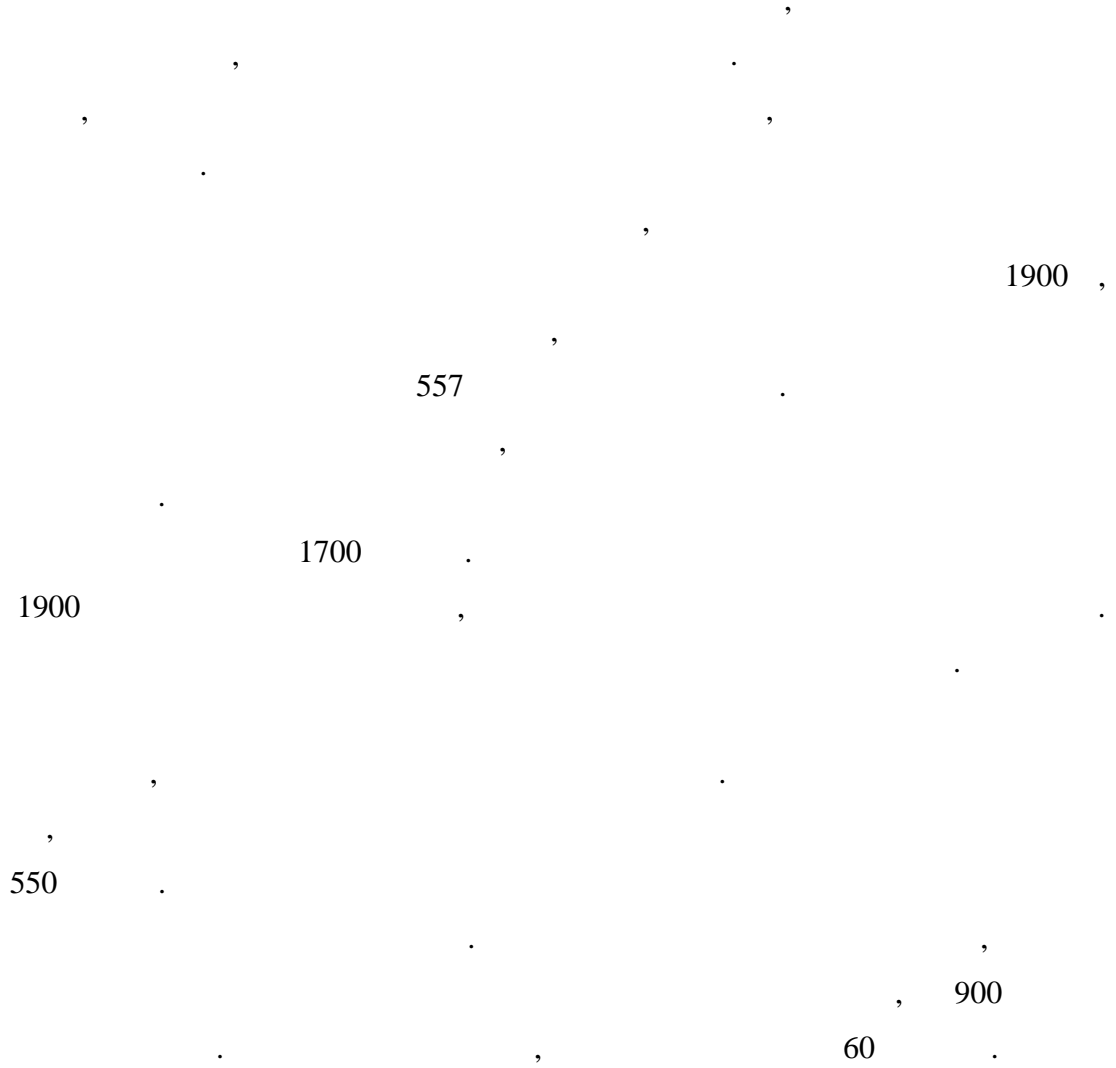
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## 2.4.



## 2.5.

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1).

I - *Quercum frainetto*. , 750 , 1050 . 11 , 787 . , ( ) ,

II - *Quercum petrae-cerris*. , . 1050 -1150 750-1000 . 7,2<sup>0</sup> , 800 . ,

III- *Fagion moesiaca*. - 1150 – 1550 , 1000-1500 5<sup>0</sup> , 827 . ,

IV-

*Vaccinioo-Piceion,*

1550 1750

1500 1700

4<sup>0</sup> ,

857

V-

*Juniperion*

*Vaccinion myrtilli.*

1750 – 1950

1700-1950

3<sup>0</sup> ,

870

VI-

*Poion violaceae.*

1950

0 ,

883

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1).\*

1950-1958

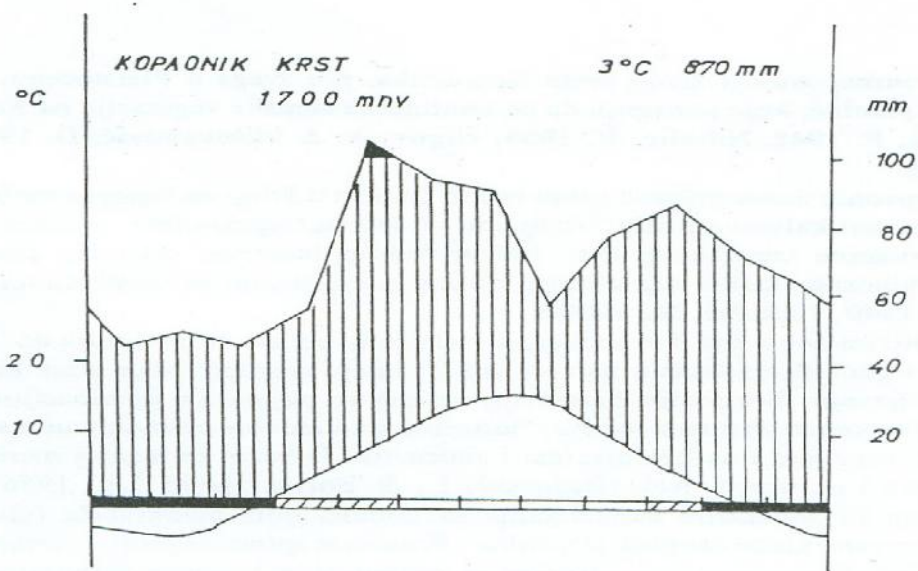
, (1954);

, (1976)

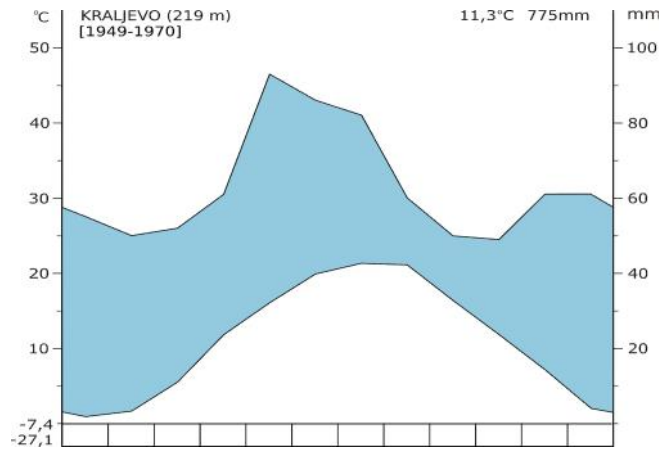
1.

|     |                     |      |     | ( )   |       |       |
|-----|---------------------|------|-----|-------|-------|-------|
|     |                     | (mm) |     | N-exp | S-exp |       |
| I   | Quercion frainetto  | 11   | 787 | 1     | -750  | -1050 |
| II  | Quercetum montanum  | 7    | 800 | 2     | -1000 | -1150 |
| III | Fagion moesiacum    | 5    | 857 | 3     | -1500 | -1550 |
| IV  | Vaccinio-Piceion    | 4    | 859 | 4     | -1650 | -1800 |
| V   | Juniperion sibirice | 3    | 870 | 5     | -1950 | -1950 |
| VI  | Poion violaceae     | 2    | 883 | 6     | -2017 | -2017 |

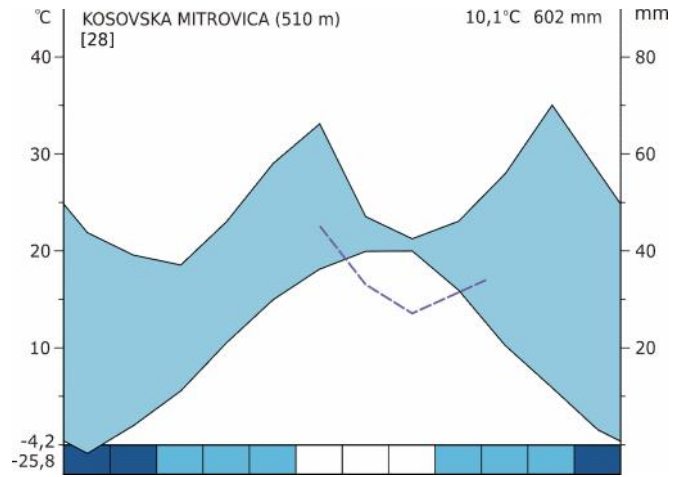
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(260 ) , ( 80 ) ( , 1982).

2. 6.

I I

( , 1984).

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### 3.

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– *Juniperus communis*,  
*Juniperus oxycedrus* i *Juniperus sibirica*

|         | 2000.         | 2003.        |   |
|---------|---------------|--------------|---|
|         | –             |              | o |
|         |               |              |   |
|         | 420 (         | 500          |   |
|         | 4%), 620 (    |              |   |
|         | 8 %), 820 (   |              |   |
|         | 14 %), 1020 ( | 12%), 1220 ( |   |
|         | 13 %), 1420 ( |              |   |
|         | 13%)          | 2100 (       |   |
| 15%), - |               |              |   |

*Juniperus*

60%

( 10 20 μ )

( , 1983).

-

( , 1979).

(



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 -  
 , *Juniperus communis*, *Juniperus oxycedrus* i *Juniperus*  
*sibirica*,

Karl Zeiss – Jena.

(μ ). ( )  
 ), μ .

- 1. -
- 2. -
- 3. -
- 1. -
- 2. -
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- 4. -
- 5. -
- 6. -
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- 9. V -
- 10. V -
- 11. -
- 11. -
- 13. -
- 14. -
- 15. -
- 16. -

$\mu^2$ .

$$P = a \times b \times x$$

6.0 (2001).

(ANOVA)

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$(\bar{X})$  ( x).

(ANOVA),

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( y, 1986).

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**3. 1. Juniperus L.**

Sp. PL. 1038 (1753); ed. 5:1005 (1754). -

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3 6  
. I 1-12 .

**3.1. 1. Juniperus oxycedrus L., Spec.**

. : 1038 (1753). - .

14 , ,  
2 , , .  
3-6 , 6-8 ,  
- , ,  
. ac. Semp MiP caesp/MesP scap.

: 800  
( , 1909) 1100 ( , 1968).  
. V

*Potentillo- Pinetum gocenzis* . , 1959, *Quercetum montanum serpetinicum* . ,  
1959. *Ostryetum caroinifoliae* **Rej. et Bor.**, 1956. :

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2. *Juniperus oxycedrus*

3. 1. 2.

*Juniperus communis L.*

Spec. Pl.:1040 (1753). – , , .

12 , . ,

7 – 16 (-30) . ,

6 – 9 , ,

3 , 3 (- 1) , ac. Semp MiP caesp/MesP scap.

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3. *Juniperus communis*

3. 1. 3.

*Juniperus sibirica* L.

Sp. PL. 4:854 (1805).-

(0,5 ), , .

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0,5 – 1, (-1,5) , - ,

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, 7 – 10 , . **ac semp Np**

**rept.**

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(1909) , ,

.. 5 – 10 .

*Vaccinieto-Junipereto-Piceetum subalpinum* (

, 1954,

*Juniperetum nane – intermediae.*

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4. *Juniperus sibirica*



## 4.

### 4. 1.

#### 4.1.1.

, ( , ), *Juniperus communis*, *Juniperus oxycedrus* *Juniperus sibirica*.  
2 5,  
6 7.

2.

*Juniperus communis*, *Juniperus oxycedrus* *Juniperus sibirica*.

| ·<br>( )                          | ·    |      | ·   |      | ·   |      |
|-----------------------------------|------|------|-----|------|-----|------|
|                                   | ( )  | ( )  | ( ) | ( )  | ( ) | ( )  |
| <b><i>Juniperus communis</i></b>  |      |      |     |      |     |      |
| 420                               | 15.1 | 1.77 | 1.4 | 0.13 | 0.6 | 0.07 |
| 620                               | 14.7 | 1.44 | 1.3 | 0.08 | 0.5 | 0.05 |
| 820                               | 14.2 | 1.30 | 1.2 | 0.15 | 0.5 | 0.05 |
| 1020                              | 13.3 | 1.23 | 1.3 | 0.14 | 0.5 | 0.04 |
| 1220                              | 13.1 | 1.21 | 1.1 | 0.08 | 0.5 | 0.04 |
| 1420                              | 11.1 | 1.49 | 1.0 | 0.14 | 0.4 | 0.06 |
| <b><i>Juniperus oxycedrus</i></b> |      |      |     |      |     |      |
| 420                               | 14.0 | 1.32 | 1.5 | 0.16 | 0.6 | 0.05 |
| 620                               | 13.7 | 1.56 | 1.4 | 0.18 | 0.6 | 0.07 |
| 820                               | 14.6 | 1.25 | 1.3 | 0.11 | 0.6 | 0.04 |
| 1020                              | 13.1 | 1.36 | 1.2 | 0.08 | 0.5 | 0.05 |
| 1220                              | 12.9 | 0.98 | 1.4 | 0.09 | 0.6 | 0.05 |
| 1420                              | 12.9 | 1.67 | 1.4 | 0.13 | 0.6 | 0.04 |
| <b><i>Juniperus sibirica</i></b>  |      |      |     |      |     |      |
| 2100                              | 6.6  | 0.65 | 1.0 | 0.09 | 0.3 | 0.06 |

2

*Juniperus communis*

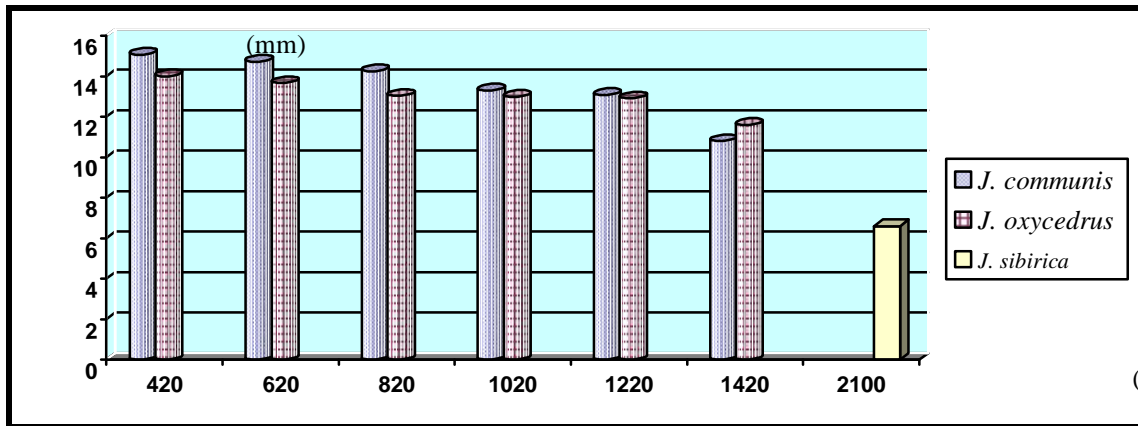
420

(15.07 ). ,

(1420 ) 10,8 .  
 19,30 420 ,  
 1420  
 8.03 .  
 ),  
*Juniperus communis*  
 420 (0.98 ) 1420 1.43 .  
 1,74 . 420  
 0,44 ,  
 1420 0,57 .  
*Juniperus oxycedrus* ( 2)  
 420 (14 ) ,  
 1420 (11.60 ) .  
 420 1.4 ,  
 , 1420 1.57 .  
*Juniperus oxycedrus*  
 . , 420 0.60 1420  
 0.64 .  
*Juniperus sibirica*  
 2100 . 6,6  
 , 1,0 0,3 .  
 ,  
 5, 6 7. 5 *Juniperus communis*  
 , . *Juniperus*  
*communis Juniperus oxycedrus*

. *Juniperus sibirica*

1400



5. *Juniperus communis*, *Juniperus oxycedrus* *Juniperus sibirica* , *Juniperus*

6

*Juniperus oxycedrus*

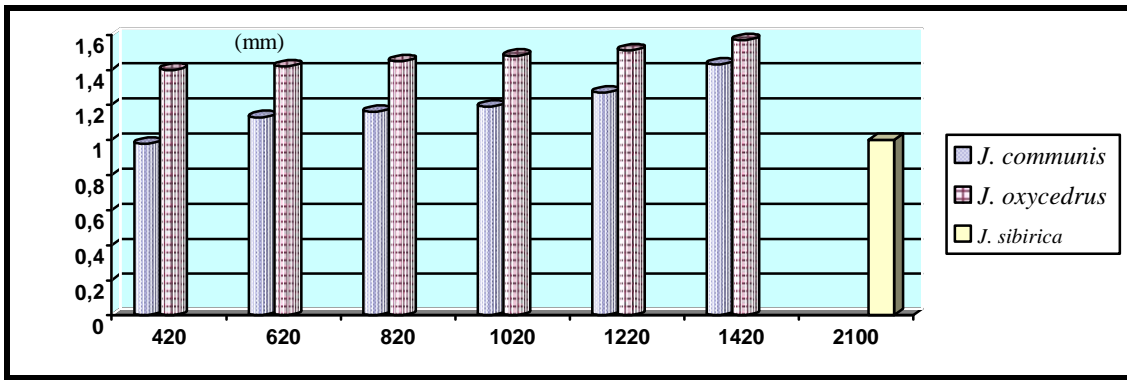
. I ( 8). I

*Juniperus oxycedrus*

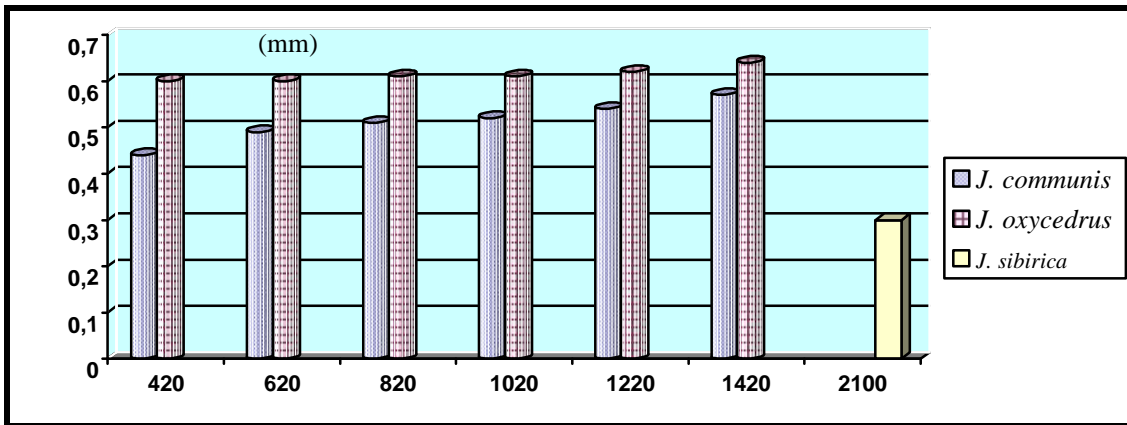
. *Juniperus sibirica*

1400

*Juniperus communis* *Juniperus oxycedrus*,



6. *Juniperus communis*, *Juniperus oxycedrus* *Juniperus sibirica*.



7. *Juniperus communis*, *Juniperus oxycedrus* *Juniperus sibirica*.

#### 4. 1. 2.

(ANOVA)

(ANOVA)

(*Juniperus communis*, *Juniperus oxycedrus* *Juniperus sibirica*.),

p<0,001 ( 3).

3. ANOVA

*Juniperus communis, Juniperus oxycedrus Juniperus sibirica.*

|  | F test (df1,2) | p        |
|--|----------------|----------|
|  | 129.86         | 0.00 *** |
|  | 80.92          | 0.00 *** |
|  | 112.51         | 0.00 *** |

4. 1. 3. ( )

4. p

, *Juniperus communis, Juniperus oxycedrus Juniperus sibirica.*

|           | V 1          | V 2          | V 3           |
|-----------|--------------|--------------|---------------|
|           | <b>0.655</b> | <b>0.726</b> | 0.224         |
|           | 0.480        | -0.539       | <b>0.705</b>  |
|           | 0.557        | -0.318       | <b>-0.775</b> |
|           | 4.995        | 0.737        | 0.134         |
| <b>p.</b> | 85.2%        | 97.7%        | 100%          |

(*Juniperus communis, Juniperus oxycedrus Juniperus sibirica.*),

4 (

). 85,2%

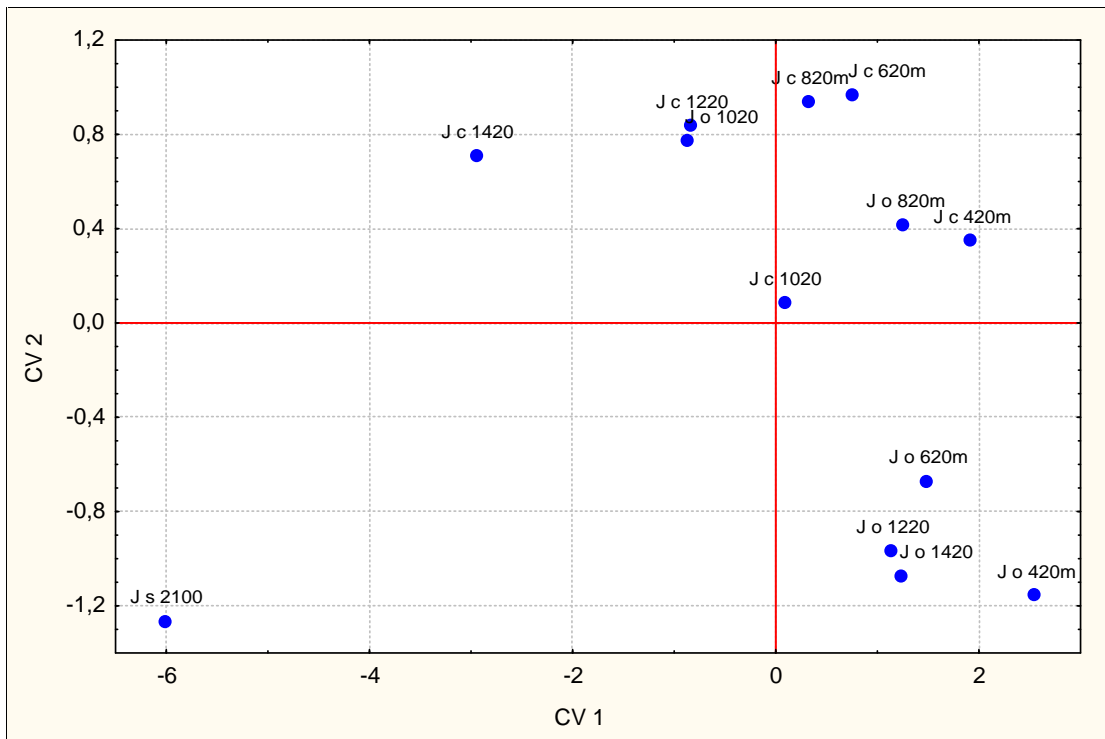
97,7%

( )

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( 8).



8.

, *Juniperus*

*communis*, *Juniperus oxycedrus* *Juniperus sibirica*.

*Juniperus sibirica* 2100

*Juniperus communis*, 1420

*Juniperus communis* *Juniperus oxycedrus*.

xy (420 620 ) (1220

1420 )

, *Juniperus sibirica*,

*Juniperus communis*,

*Juniperus*

*oxycedrus*

(820 1020 ).

, ( 9)

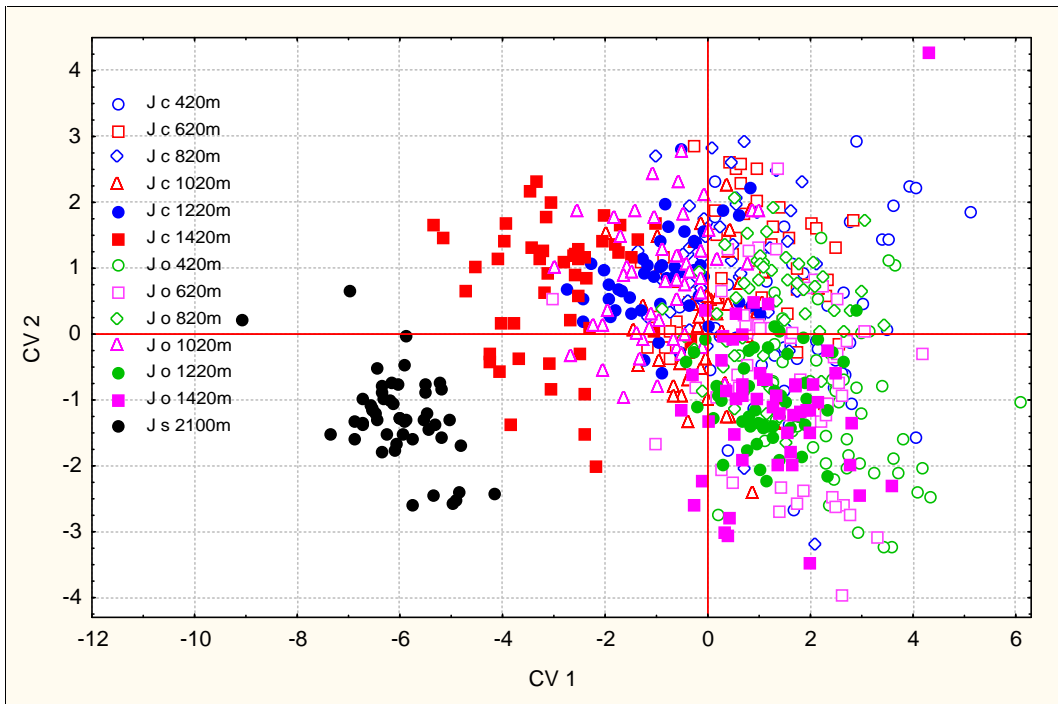
*Juniperus sibirica*,

*Juniperus communis*

1420 .

*Juniperus communis*

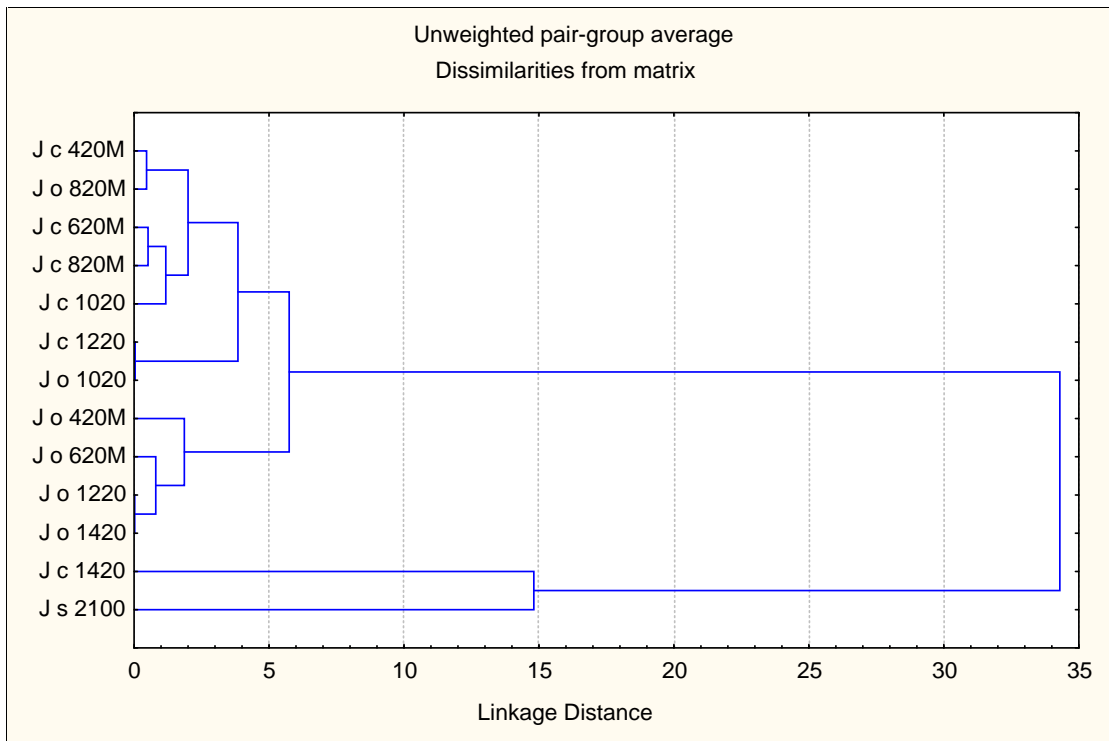
*Juniperus oxycedrus*



9.

, *Juniperus*

*communis*, *Juniperus oxycedrus* *Juniperus sibirica*.



10.

*Juniperus communis*, *Juniperus oxycedrus* *Juniperus sibirica*.

( 10 ) p

p                      p                      p                      *Juniperus*

*communis*                      1420                      *Juniperus sibirica*                      2100 ,

.                      .                      .

*Juniperus oxycedrus*                      (420

620 )                      (1420                      1220 )                      .                      p

*Juniperus oxycedrus*                      (820

1020 )                      *Juniperus communis*.

p

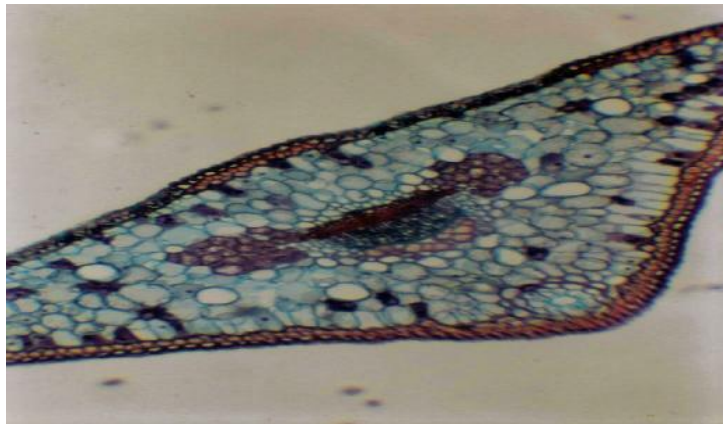
*Juniperus communis*                      *Juniperus oxycedrus*,

,

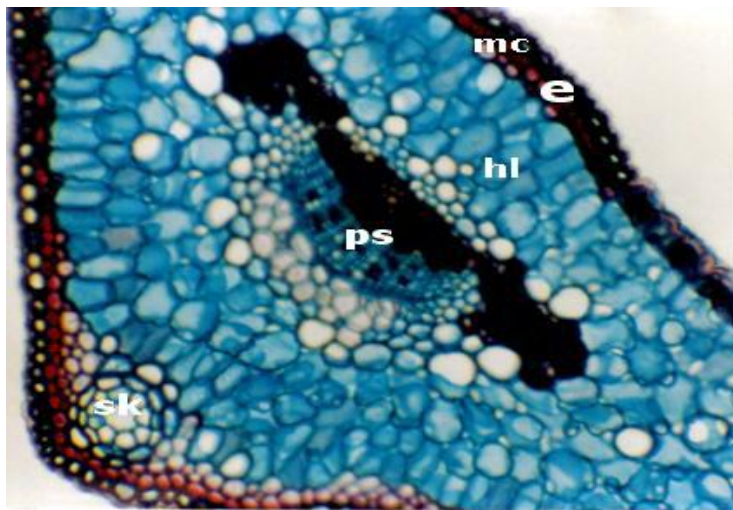
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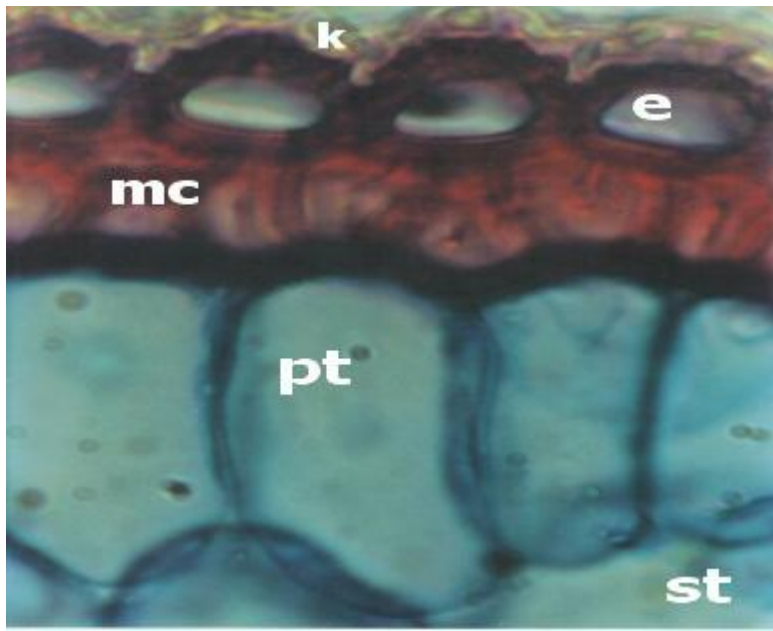




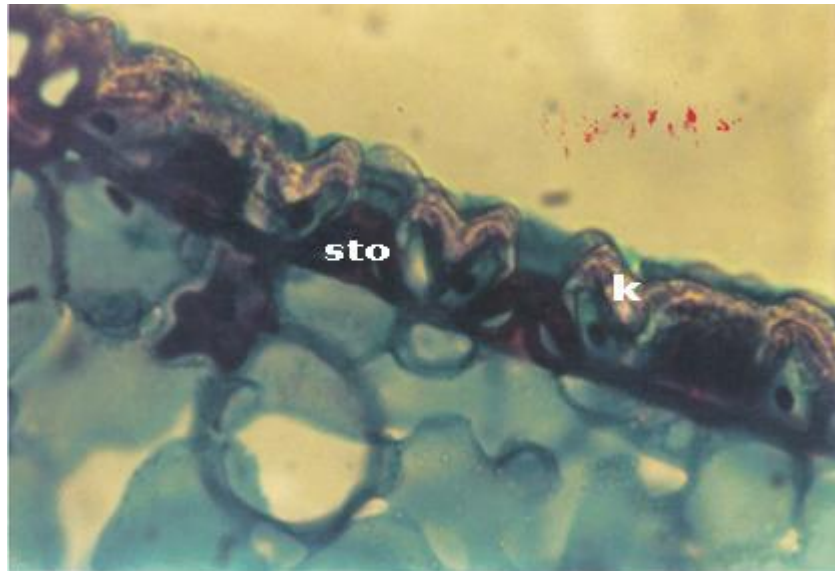
11. *Juniperus communis*, ( x 6,3).



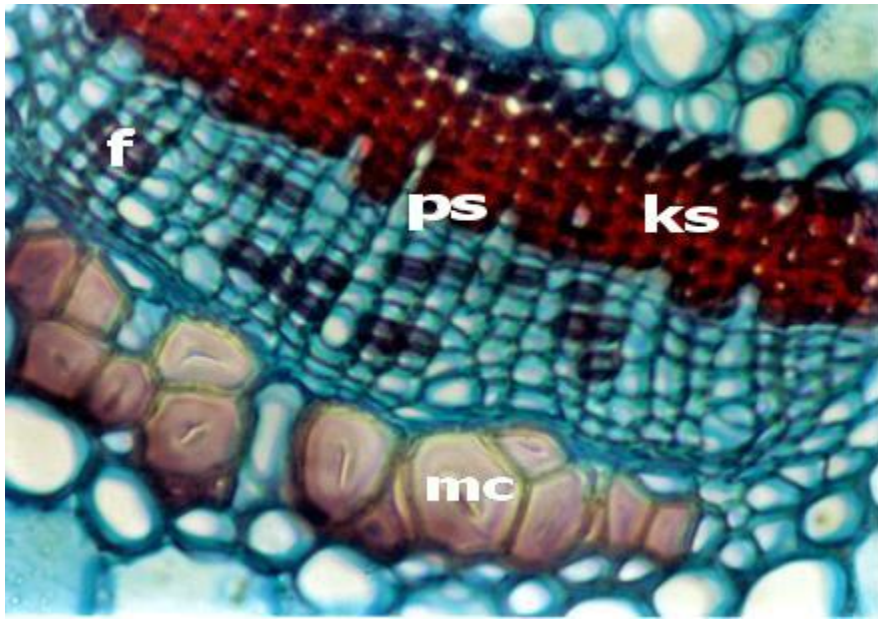
12. *Juniperus communis*, - p , - , - p , - ( x 20).



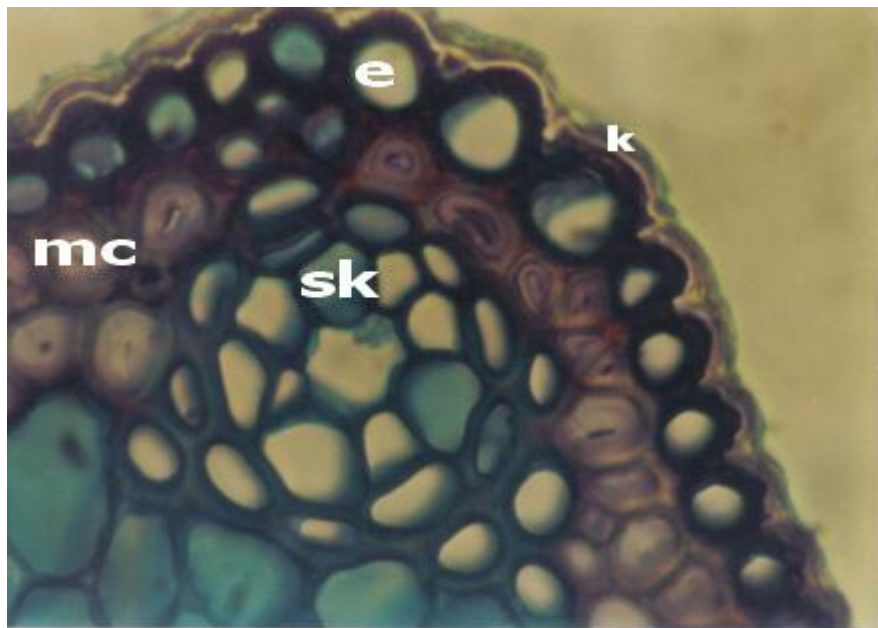
13. *Juniperus communis*, - , - , - ( x 40).



14. *Juniperus communis*, - , - ( x 40).



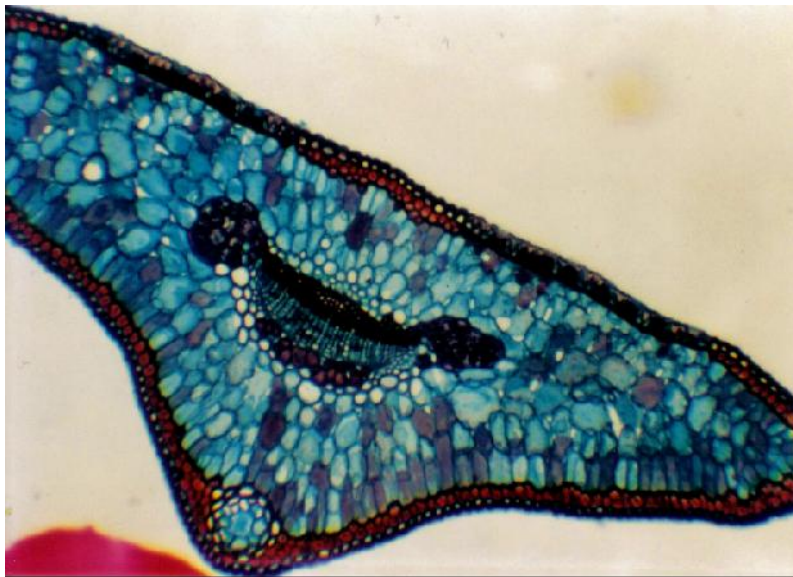
15. *Juniperus communis*, - , - , - ( x 20).



16. *Juniperus communis*, - , - , - ( x 40).

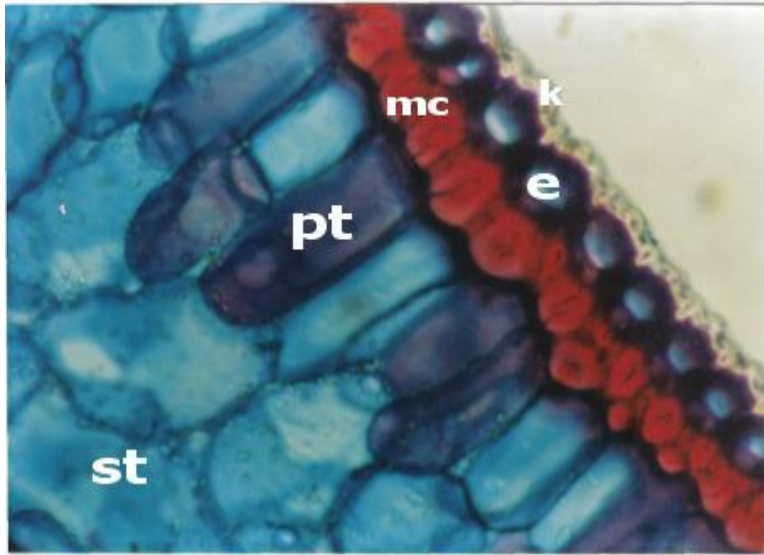
*Juniperus oxycedrus* ( 17)

( 16)

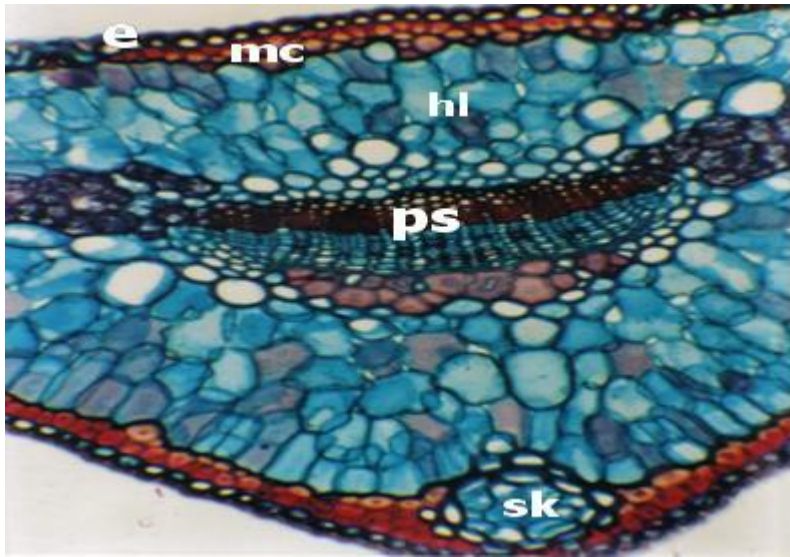


17.

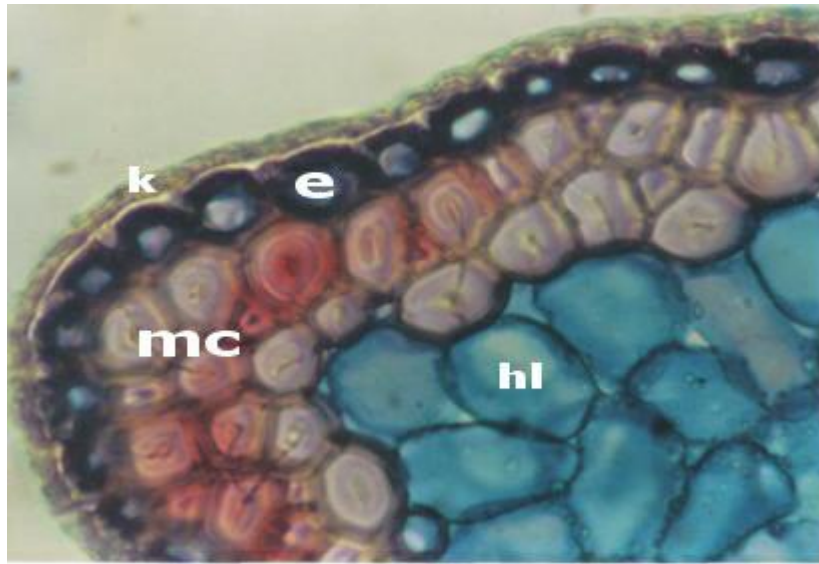
*Juniperus oxycedrus* ( x 6,3).



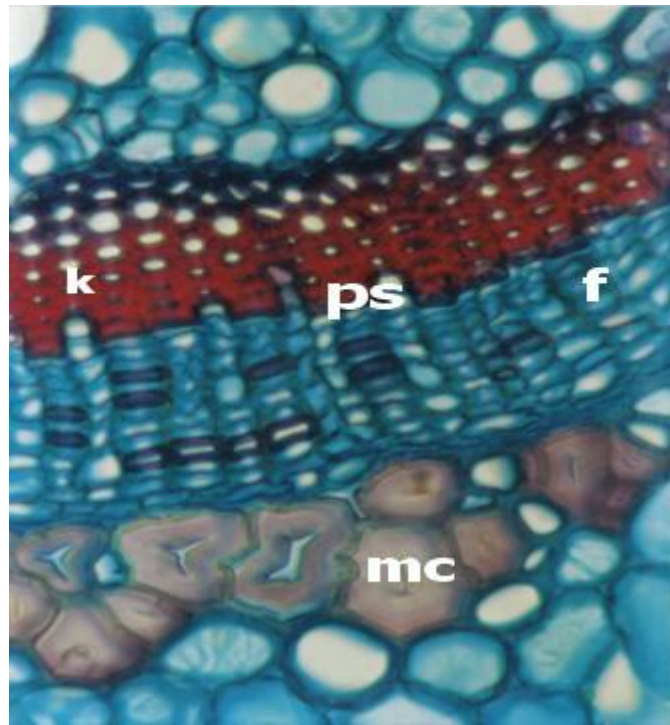
18. *Juniperus oxycedrus*, - , - , -  
 , - , - . - ,  
 ( x 40)



19. *Juniperus oxycedrus*, - , -  
 , - , - , - ( x  
 20).



20. *Juniperus oxycedrus*, - , - , - , - ( x 40).

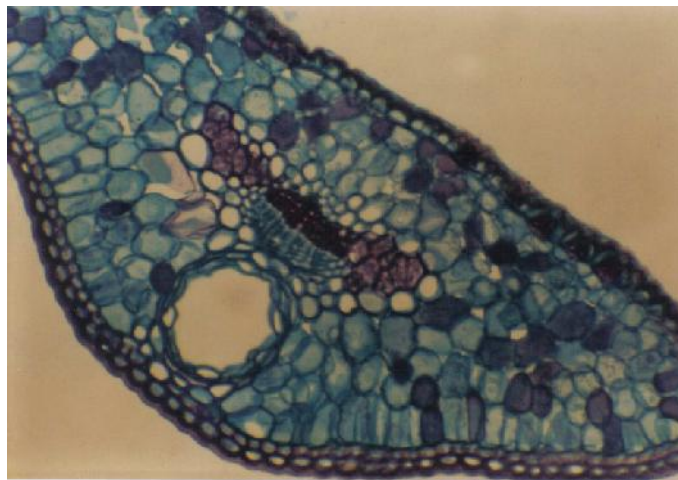


21. *Juniperus oxycedrus*, - , - , - ( x 20)

*Juniperus sibirica* ( 22)

( 28)

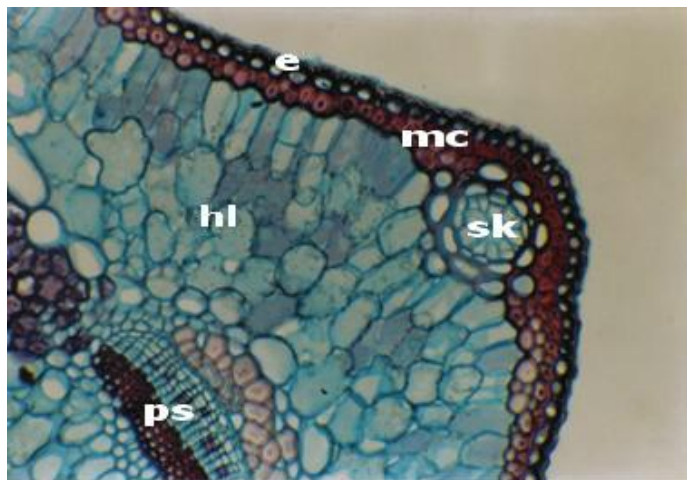
( 25 ).



22.

*Juniperus sibirica* (

x 6,3).



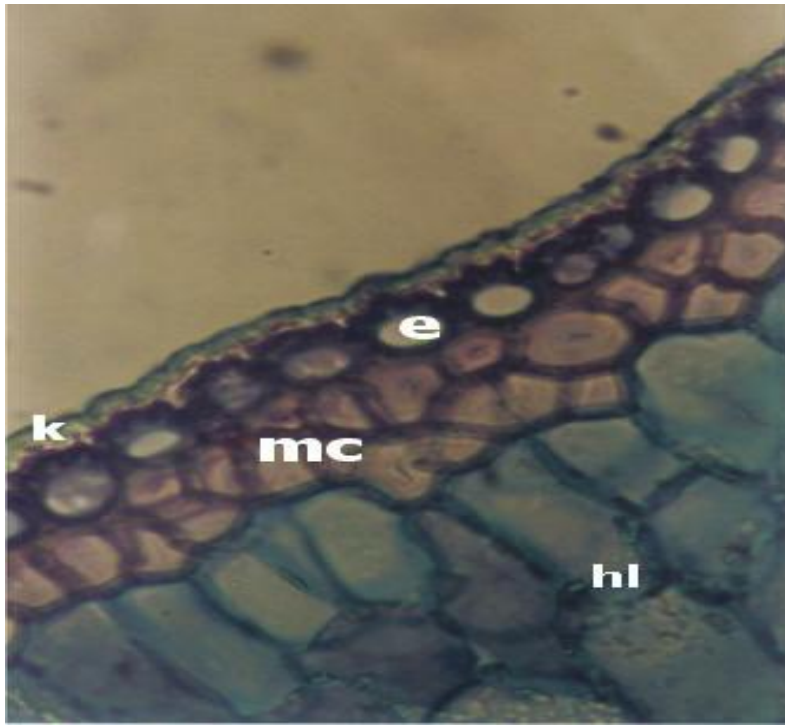
23.

*Juniperus sibirica*, -

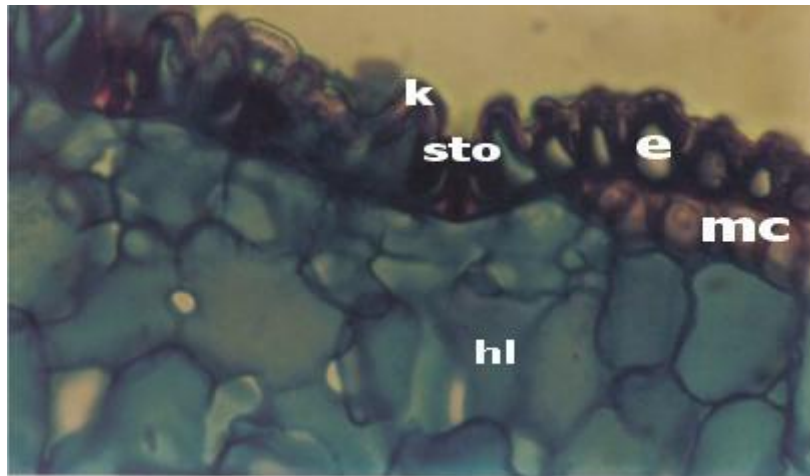
, -

( x 20).

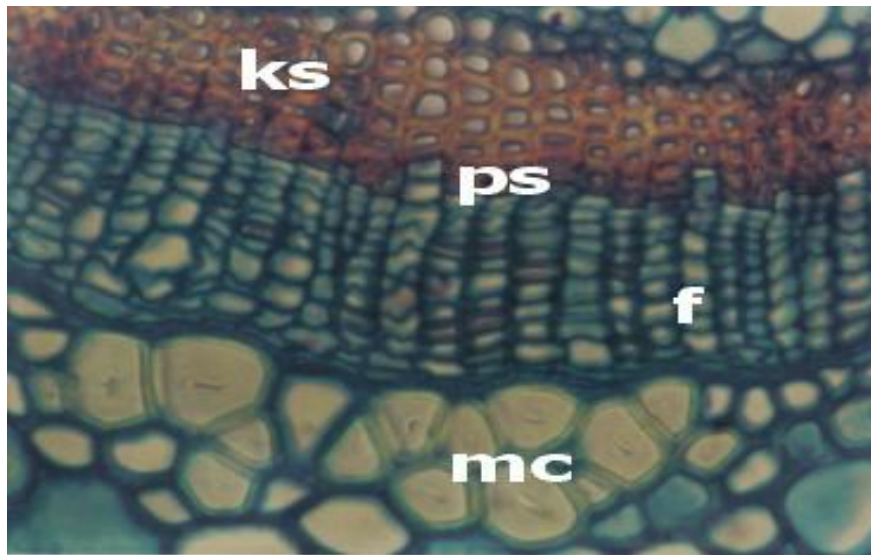




24. *Juniperus sibirica*, - , - , - , - ( x 40).



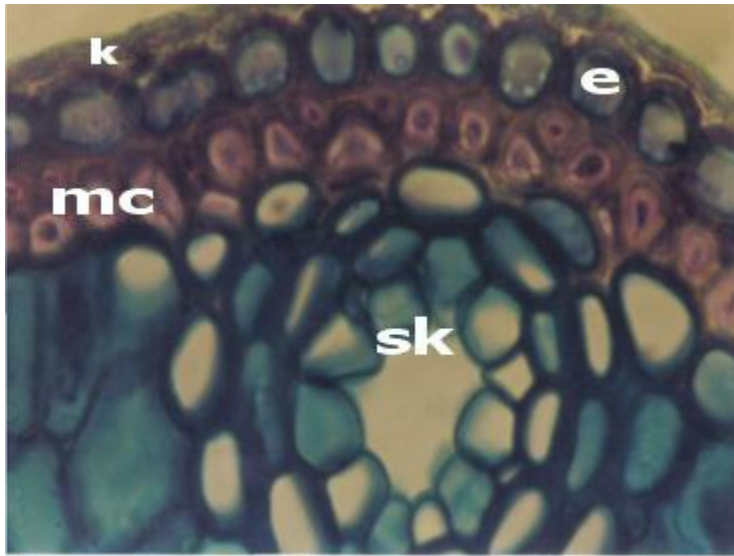
25. *Juniperus sibirica*, - , - , - , - , - ( x 40).



26. *Juniperus sibirica*, - - , - , - ( x 20).



27. *Juniperus sibirica*, - - , - , - ( x 40).



28. *Juniperus sibirica*, - , - , - , - ( x 40).

5 6, 16

*Juniperus communis*. 5 29

*Juniperus communis* 420

388.7 μ

1420

481.9 μ .

620 .

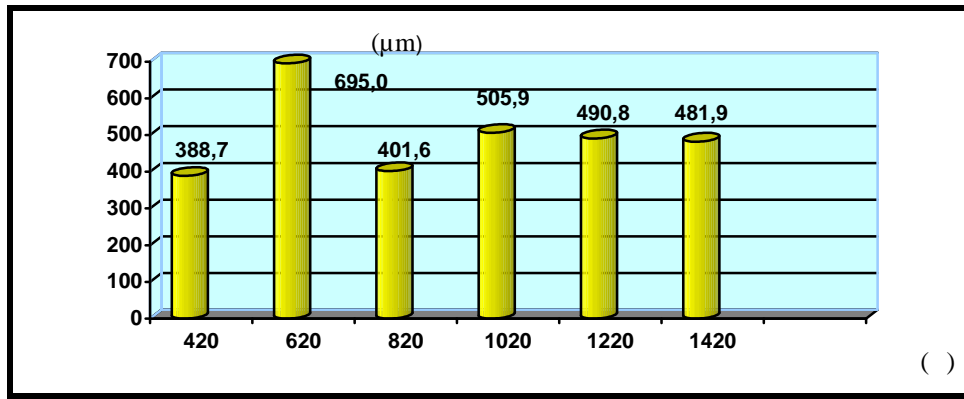
(

,

,

,

),



29).

(*Juniperus communis*)

*Juniperus communis*

420 (388.7 μ ),

1020 (505.9 μ ),

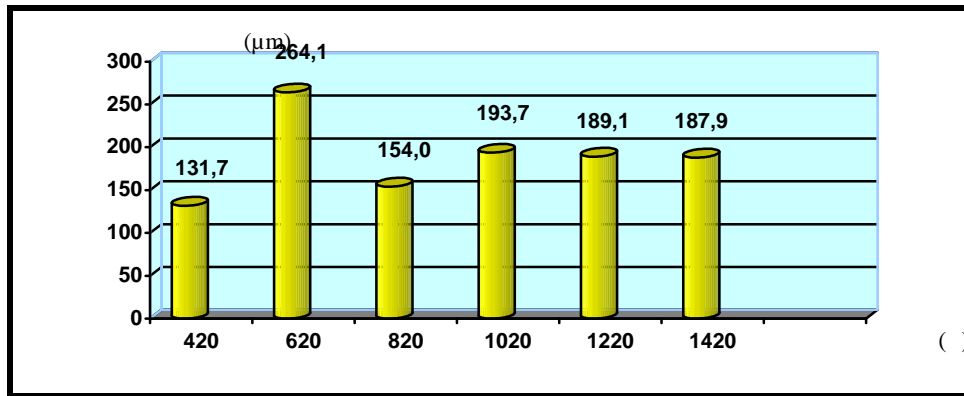
1420 481.9μ . ( 5

29).

5.

*(Juniperus**communis*).

| (~ ) |           | ( )    |       |        |       |       |       |
|------|-----------|--------|-------|--------|-------|-------|-------|
|      |           | 420    | 620   | 820    | 1020  | 1220  | 1420  |
|      | $\bar{X}$ | 388.7  | 695   | 401.6  | 505.9 | 490.8 | 481.9 |
|      |           | 270    | 630   | 280    | 350   | 420   | 400   |
|      | <b>x</b>  | 430    | 780   | 540    | 670   | 630   | 660   |
|      | $\bar{X}$ | 131.75 | 264.1 | 154.05 | 193.7 | 189.1 | 187.9 |
|      |           | 120    | 200   | 120    | 140   | 150   | 170   |
|      | <b>x</b>  | 160    | 350   | 200    | 270   | 220   | 210   |
|      | $\bar{X}$ | 0.79   | 1.71  | 1.04   | 1.27  | 1.06  | 1.26  |
|      |           | 0.41   | 0.83  | 0.41   | 0.41  | 0.83  | 0.83  |
|      | <b>x</b>  | 0.83   | 3.32  | 1.66   | 2.49  | 2.49  | 2.90  |
|      | $\bar{X}$ | 0.80   | 1.45  | 1.32   | 1.57  | 0.97  | 1.18  |
|      |           | 0.41   | 0.83  | 0.41   | 0.41  | 0.83  | 0.41  |
|      | <b>x</b>  | 1.66   | 3.32  | 2.075  | 2.49  | 1.245 | 2.49  |
|      | $\bar{X}$ | 1.19   | 3.06  | 1.70   | 1.95  | 2.30  | 2.02  |
|      |           | 0.83   | 1.24  | 0.83   | 0.83  | 1.24  | 0.83  |
|      | <b>x</b>  | 2.07   | 4.98  | 2.07   | 3.32  | 4.15  | 2.90  |
|      | $\bar{X}$ | 0.41   | 0.52  | 0.415  | 0.45  | 0.70  | 0.60  |
|      |           | 0.41   | 0.41  | 0.41   | 0.41  | 0.41  | 0.41  |
|      | <b>x</b>  | 0.41   | 0.83  | 0.415  | 0.83  | 1.245 | 0.83  |
|      | $\bar{X}$ | 3.6    | 7.38  | 3.68   | 3.97  | 4.55  | 4.45  |
|      |           | 2.49   | 4.15  | 2.49   | 2.49  | 2.07  | 2.49  |
|      | <b>x</b>  | 4.98   | 9.13  | 4.98   | 5.81  | 7.47  | 6.22  |
|      | $\bar{X}$ | 3.57   | 7.35  | 3.51   | 4.46  | 4.41  | 4.73  |
|      |           | 2.49   | 4.98  | 2.07   | 2.49  | 2.49  | 2.07  |
|      | <b>x</b>  | 4.98   | 9.13  | 5.81   | 6.22  | 5.81  | 6.64  |



30.

(*Juniperus communis*)

*Juniperus communis*

420

131.75 µ .

1420

187.9 µ (

5

30).

31

5

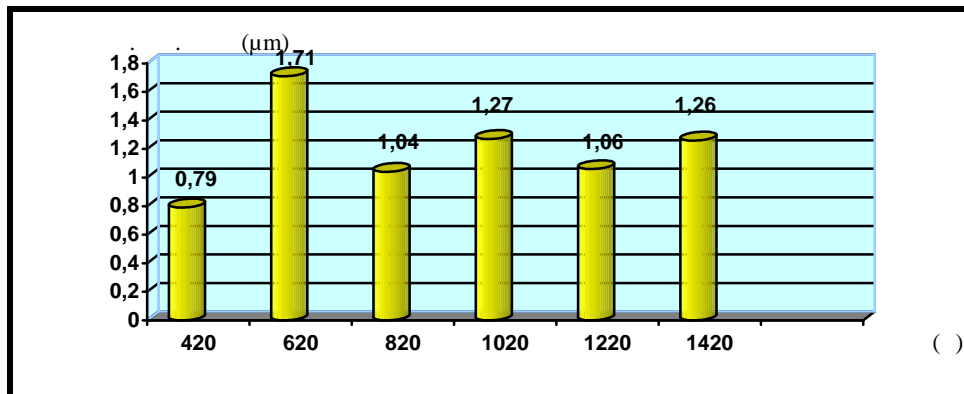
420

0.79 µ

1420

1.26

µ ,



31.

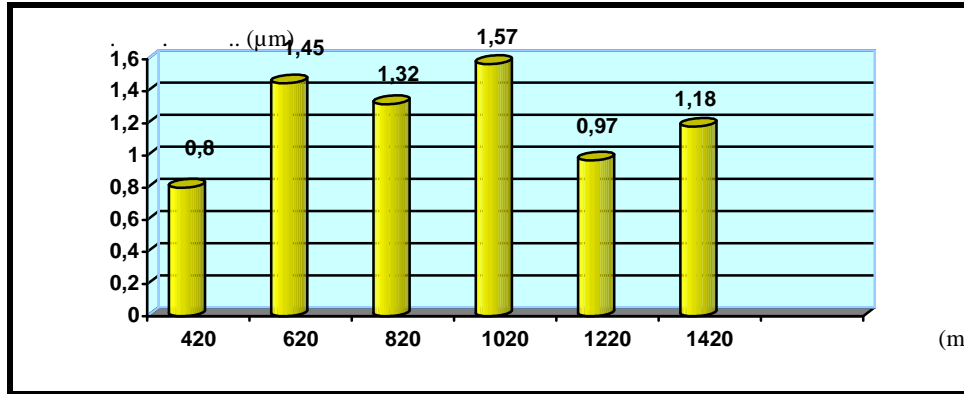
*communis*)

(*Juniperus*

*Juniperus communis*

μ 1020 1.57 μ . 420 0.80  
 , 1420  
 1.18 μ . ( 5

32).



32.

(*Juniperus*

*communis*)

33

5

*Juniperus communis*

420

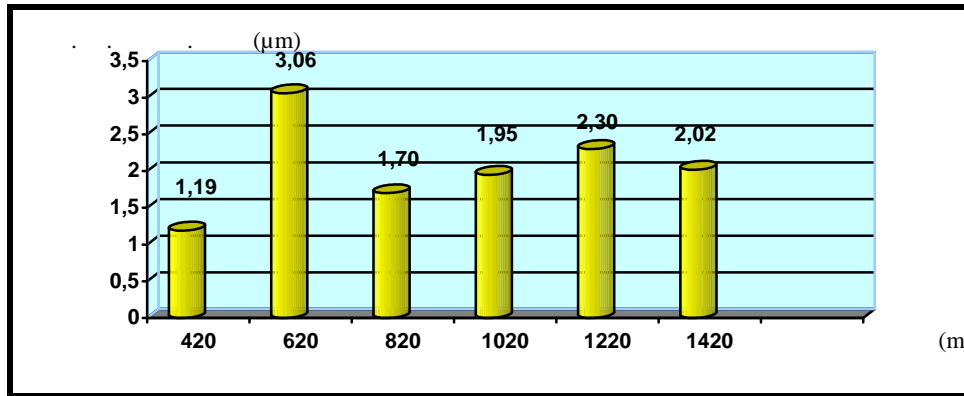
1.19 μ ,

1220

2.3μ ,

1420 ,

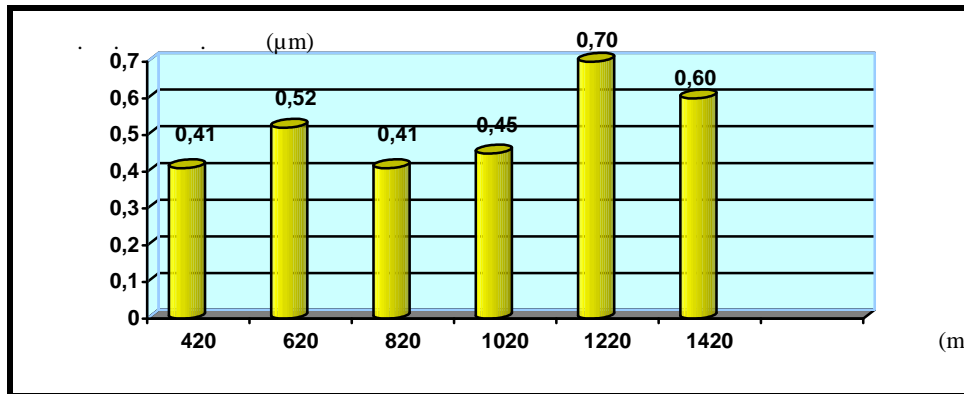
2.02 μ .



33.

(*Juniperus communis*)

420 ,  
 0.41 μ ,  
 , 1220  
 0.7 μ , 1420 0.6 μ ,  
 5 34.



34.

(*Juniperus communis*)

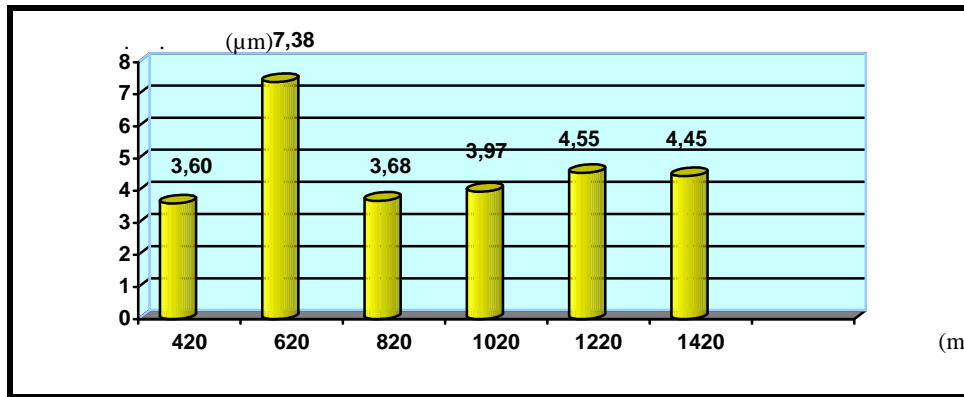
( 5 35)  
 420 3.6  
 μ . ,  
 1220 4.55 μ .  
 1420 4.45 μ .



36 5,

420 3.57 μ ,

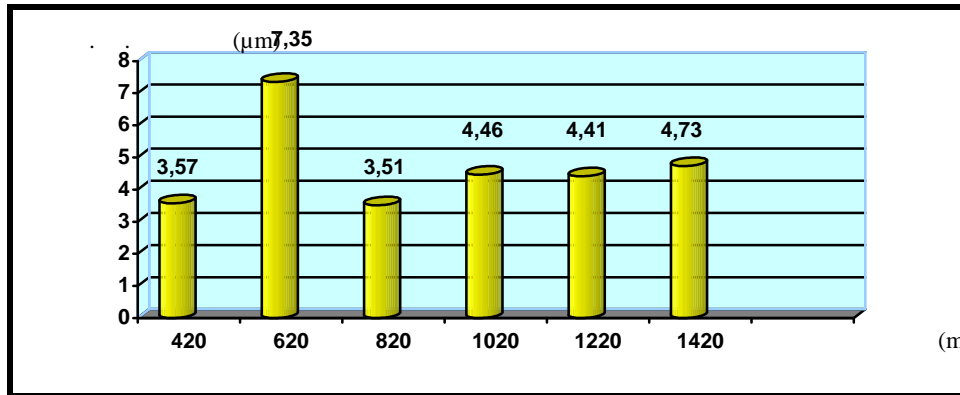
1420 4.73 μ .



35.

*communis* )

(*Juniperus*



36.

*communis* )

(*Juniperus*

*Juniperus communis*

1220 420 2.72 μ 2.74 μ ,

*Juniperus communis*

1420 , 3.12 μ .

37

6

420 (2.45 μ ),

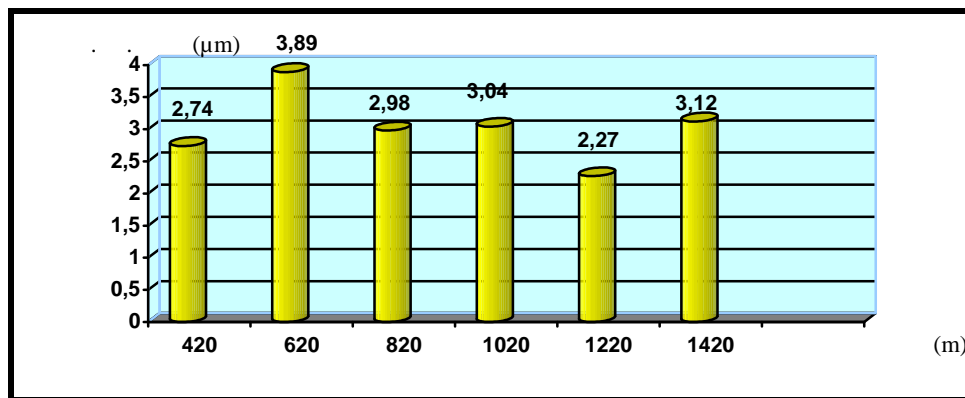
1020 (3.05 μ ),

1420

2.94 μ

( 6 38).

( ),



37.

*communis* )

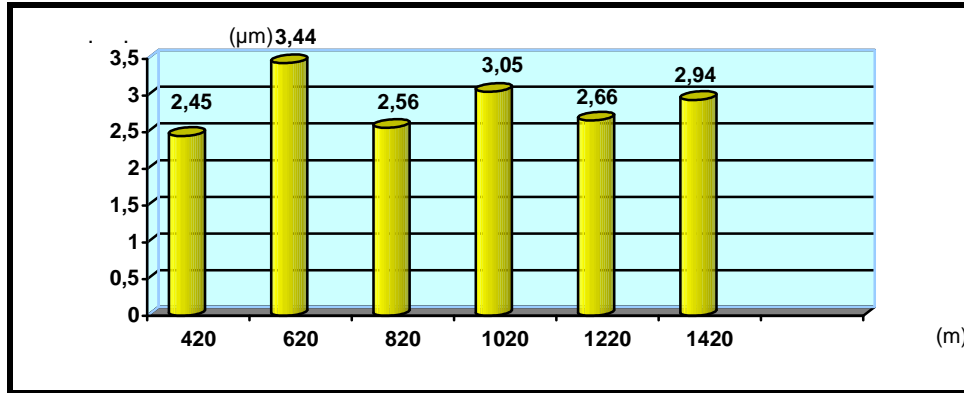
(*Juniperus*

6.

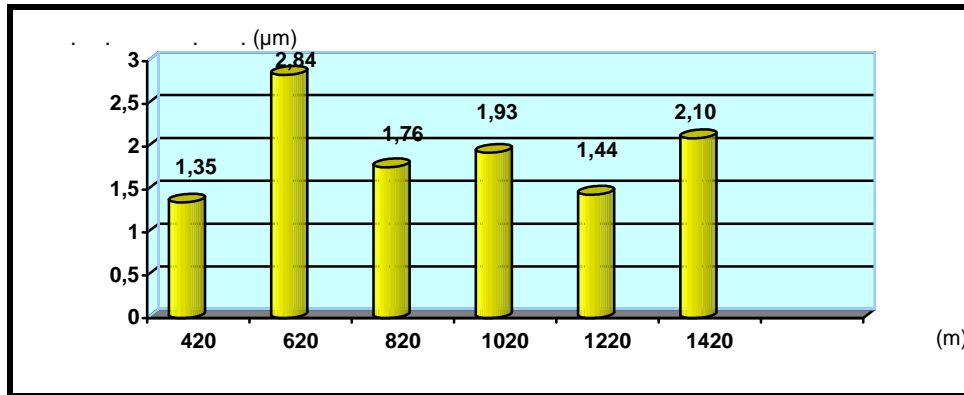
*(Juniperus**communis* ).

| ( ~ ) |           | ( )   |       |              |        |       |       |
|-------|-----------|-------|-------|--------------|--------|-------|-------|
|       |           | 420   | 620   | 820          | 1020   | 1220  | 1420  |
|       | $\bar{X}$ | 2.74  | 3.89  | 2.98         | 3.04   | 2.27  | 3.12  |
|       |           | 1.66  | 2.49  | 2.07         | 1.66   | 0.83  | 1.66  |
|       | <b>x</b>  | 4.15  | 5.81  | 4.15         | 4.56   | 4.15  | 4.57  |
|       | $\bar{X}$ | 2.45  | 3.44  | 2.56         | 3.05   | 2.66  | 2.94  |
|       |           | 1.66  | 1.66  | 1.66         | 2.08   | 1.66  | 2.08  |
|       | <b>x</b>  | 3.73  | 4.98  | 3.73         | 4.56   | 4.57  | 4.15  |
|       | $\bar{X}$ | 42.76 | 84.85 | 46.38        | 68.21  | 66.44 | 59.38 |
|       |           | 34.86 | 55    | 29.88        | 36.52  | 49.8  | 48.14 |
|       | <b>x</b>  | 51.46 | 110.  | 74.70        | 106.24 | 86.32 | 76.36 |
|       | $\bar{X}$ | 20.70 | 40.70 | 24.40        | 29.23  | 27.36 | 27.94 |
|       |           | 16.6  | 30    | 16.6         | 24.90  | 21.58 | 21.58 |
|       | <b>x</b>  | 24.90 | 50.0  | 33.20        | 34.86  | 34.86 | 38.18 |
|       | $\bar{X}$ | 0.415 | 0.87  | 0.44         | 0.49   | 0.87  | 0.65  |
|       |           | 0.415 | 0.415 | 0.415        | 0.415  | 0.415 | 0.415 |
|       | <b>x</b>  | 0.41  | 2.07  | 0.83         | 0.83   | 1.66  | 1.24  |
|       | $\bar{X}$ | 1.35  | 2.84  | 1.76         | 1.93   | 1.44  | 2.1   |
|       |           | 0.83  | 0.83  | 0.83         | 1.24   | 0.83  | 0.83  |
|       | <b>x</b>  | 2.49  | 4.15  | 2.49         | 3.32   | 3.32  | 2.49  |
|       | $\bar{X}$ | 39.6  | 67.60 | 40.10        | 45.30  | 53.48 | 53.05 |
|       |           | 28.22 | 49.50 | 66.40        | 21.58  | 33.20 | 39.84 |
|       | <b>x</b>  | 53.12 | 63.91 | <b>69.92</b> | 74.70  | 74.70 | 88.00 |
|       | $\bar{X}$ | 40.63 | 54.04 | 44.35        | 48.80  | 56.14 | 53.02 |
|       |           | 26.56 | 33.00 | 16.60        | 23.24  | 36.52 | 33.20 |
|       | <b>x</b>  | 54.78 | 53.98 | 63.80        | 74.40  | 84.66 | 74.70 |

6 39, *Juniperus communis*  
 420 1.35 μ ,  
 1420 2.1 μ .



38. (*Juniperus communis*)



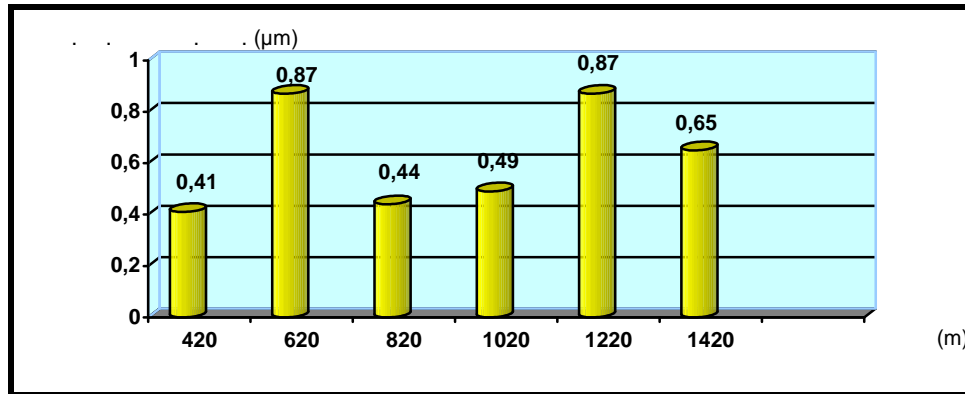
39. (*Juniperus communis*)

( 6 40). ,  
 420 0.41 μ , 820 0.44 μ .

1220 (0.87 μ ),

1430

0.65 μ .



40.

(*Juniperus communis*)

*Juniperus communis*

420 (42.76 μ ),

1020 (68.21 μ ),

1220 1420

66.44μ

58.38μ ,

6

41.

6

42.

*Juniperus communis*

420 (20.7 μ ),

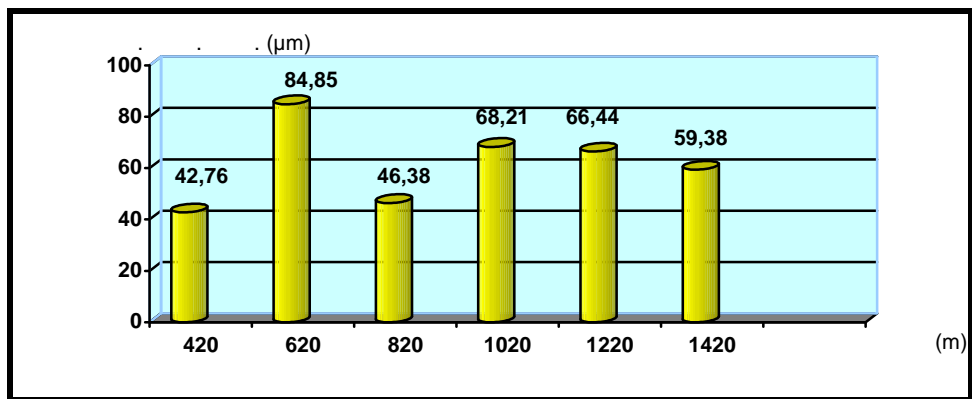
1020 (29.23 μ ),

1220

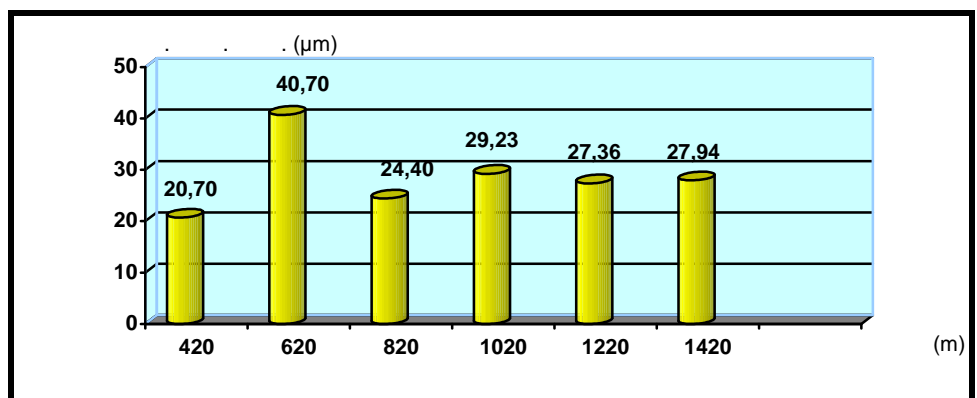
(27.36 μ ),

1420

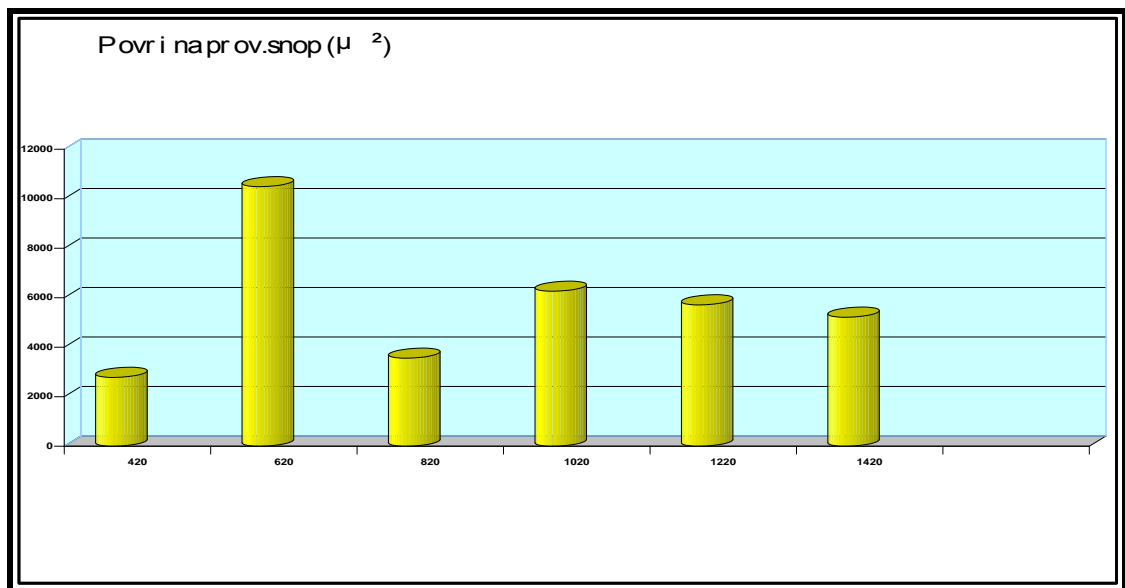
27.94 μ .



41.  
(*Juniperus communis*)



42.  
(*Juniperus communis*)



43.  
(*Juniperus communis*)

( 43).

(10843,66  $\mu^2$ ),  
(2779,3  $\mu^2$ ).

620

420

6 44.

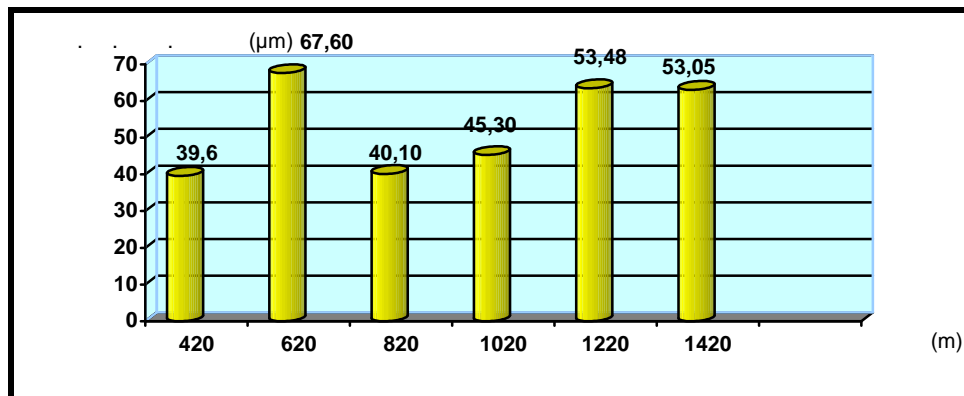
*Juniperus communis*

420 (39.6  $\mu$  ).

1220 (53.48  $\mu$  ),

1420

53.05  $\mu$  .



44.

*communis* )

(*Juniperus*

, *Juniperus communis*

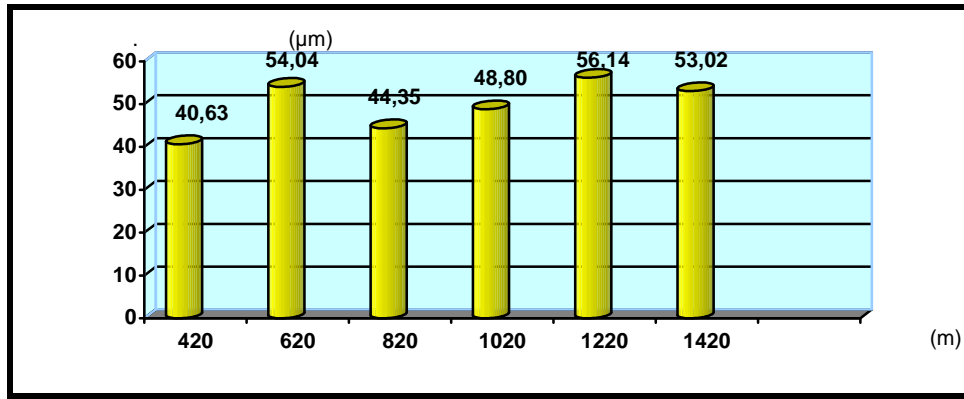
420 (40.63  $\mu$  ).

820 , 1020 1220

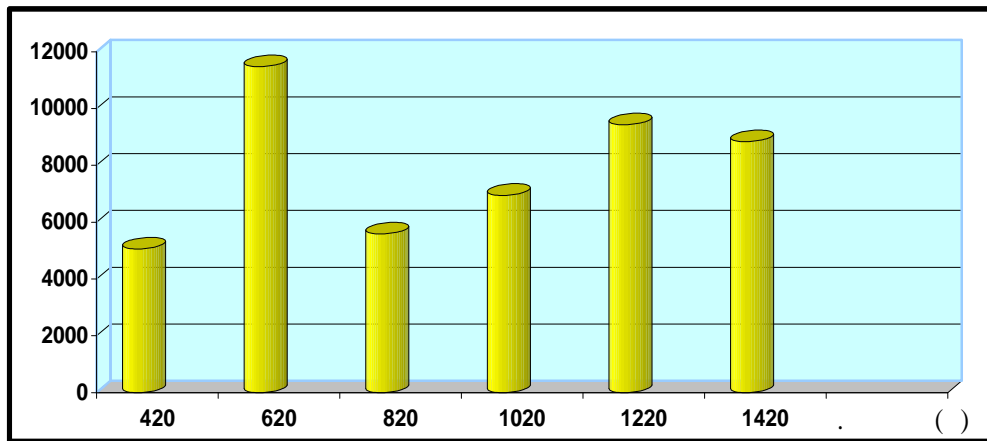
44,35, 48.8 56.14  $\mu$  ,

1420

(53.92) ( 6 45).



45. *Juniperus communis*



46. *Juniperus communis*

46

(11470,74 µ<sup>2</sup>).

7 8

7 47,

820 , 502.8 µ

753.6 µ .

620

420 820

1200

*Juniperus oxicedrus.*

*Juniperus oxicedrus*

1420



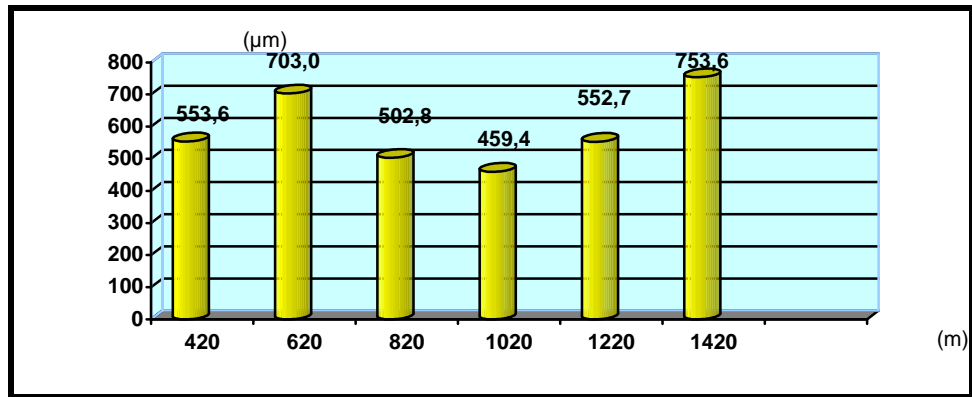
p

*Juniperus oxycedrus*

620 .

*Juniperus communis*,

620 ,



47.

(*Juniperus oxycedrus*)

7.  
oxycedrus).

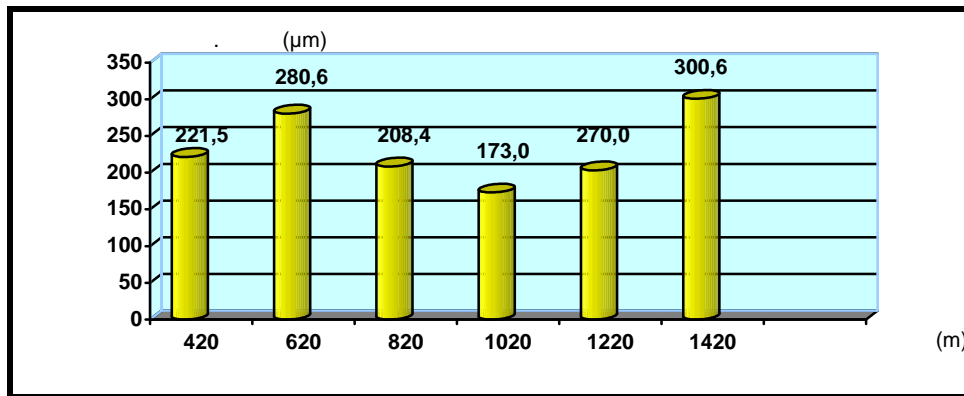
(Juniperus

| ( ~ ) |           | ( )   |       |       |       |       |       |
|-------|-----------|-------|-------|-------|-------|-------|-------|
|       |           | 420   | 620   | 820   | 1020  | 1220  | 1420  |
|       | $\bar{X}$ | 553.6 | 703   | 502.8 | 459.4 | 552.7 | 753.6 |
|       |           | 470   | 670   | 420   | 330   | 450   | 420   |
|       | <b>x</b>  | 630   | 980   | 560   | 550   | 690   | 950   |
|       | $\bar{X}$ | 221.5 | 280.6 | 208.4 | 173   | 203.1 | 300.6 |
|       |           | 180   | 230   | 180   | 130   | 150   | 180   |
|       | <b>x</b>  | 240   | 380   | 240   | 210   | 270   | 390   |
|       | $\bar{X}$ | 1.75  | 2.80  | 20.25 | 1.18  | 1.75  | 2.49  |
|       |           | 0.41  | 1.66  | 1.24  | 0.41  | 0.83  | 1.66  |
|       | <b>x</b>  | 2.90  | 4.98  | 3.32  | 2.07  | 3.32  | 3.73  |
|       | $\bar{X}$ | 1.79  | 2.66  | 2.29  | 1.24  | 2.26  | 2.88  |
|       |           | 0.415 | 1.66  | 1.66  | 0.83  | 1.25  | 1.66  |
|       | <b>x</b>  | 3.32  | 3.32  | 3.32  | 2.49  | 2.91  | 4.15  |
|       | $\bar{X}$ | 1.54  | 2.15  | 1.56  | 1.13  | 1.49  | 1.92  |
|       |           | 0.415 | 0.83  | 0.83  | 0.83  | 0.83  | 0.83  |
|       | <b>x</b>  | 2.075 | 3.32  | 1.49  | 2.08  | 2.08  | 3.32  |
|       | $\bar{X}$ | 1.54  | 0.83  | 0.415 | 0.415 | 0.415 | 0.415 |
|       |           | 0.415 | 0.83  | 0.415 | 0.415 | 0.415 | 0.415 |
|       | <b>x</b>  | 2.075 | 1.66  | 1.25  | 0.83  | 0.83  | 0.83  |
|       | $\bar{X}$ | 3.55  | 5.39  | 3.73  | 3.73  | 3.86  | 5.19  |
|       |           | 2.49  | 3.32  | 2.07  | 2.49  | 2.49  | 2.90  |
|       | <b>x</b>  | 5.81  | 9.96  | 5.81  | 4.57  | 5.39  | 8.3   |
|       | $\bar{X}$ | 3.37  | 5.4   | 3.49  | 3.15  | 3.90  | 5.35  |
|       |           | 2.905 | 1.66  | 1.66  | 2.49  | 2.49  | 2.49  |
|       | <b>x</b>  | 4.98  | 9.13  | 4.98  | 4.58  | 5.39  | 8.30  |

*Juniperus oxycedrus*

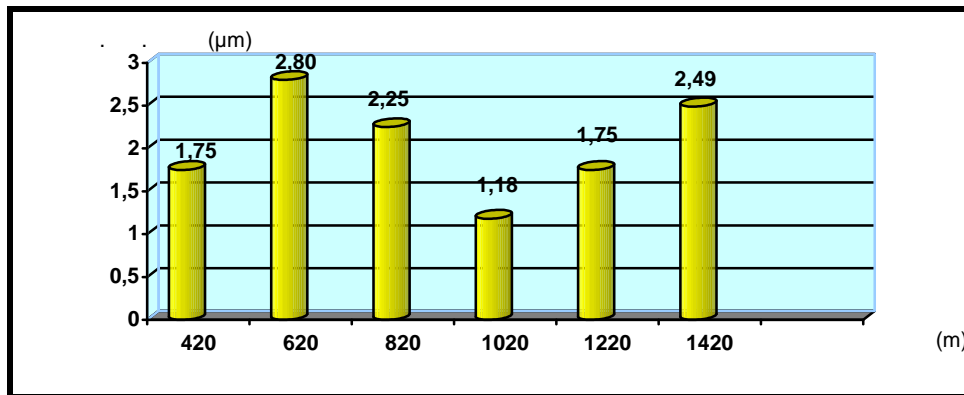
1020

173  $\mu$  , 1420  
 300.6  $\mu$  ( 48 7). ,  
 ( 49), 6  
 1020 1.18  $\mu$  ,  
 820 420 (2.25  $\mu$  1.75  $\mu$  ).  
 , 1220 1420  
 1.75  $\mu$  2.49  $\mu$  ,  
 49.



48.

(*Juniperus oxycedrus*)



49.

*oxycedrus* )

(*Juniperus*

*Juniperus oxycedrus* p

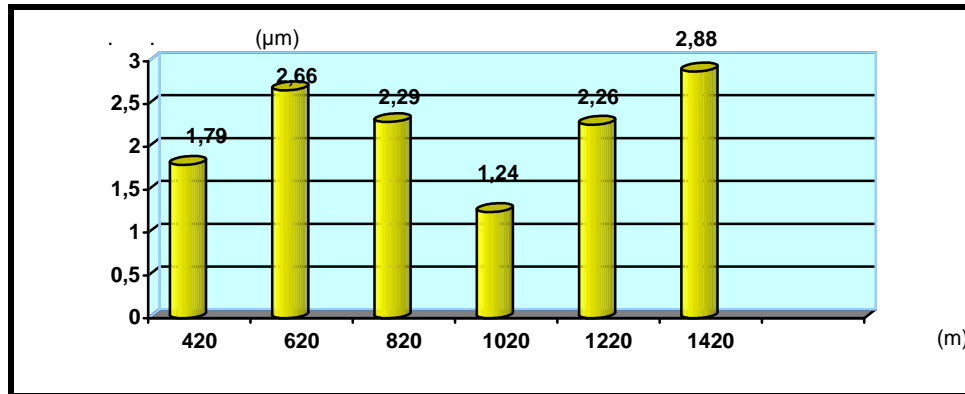
p , 420

1.79 μ , p 1020

(1.24μ ). 1420 2.88 μ .

p

( 7 50).



50. *Juniperus oxycedrus* (m)

p

*Juniperus oxycedrus* 1420 (1.92

μ ), , 1020 (1.13 μ ). 7 51

,

p

1420 (0.31 μ ),

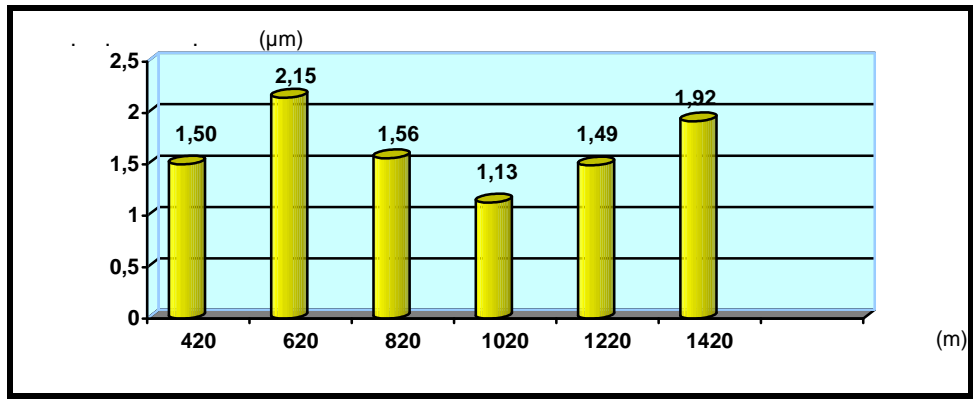
1020 1420 (0.46 μ 0.48 μ ).

1220 (0.56 μ ).

,

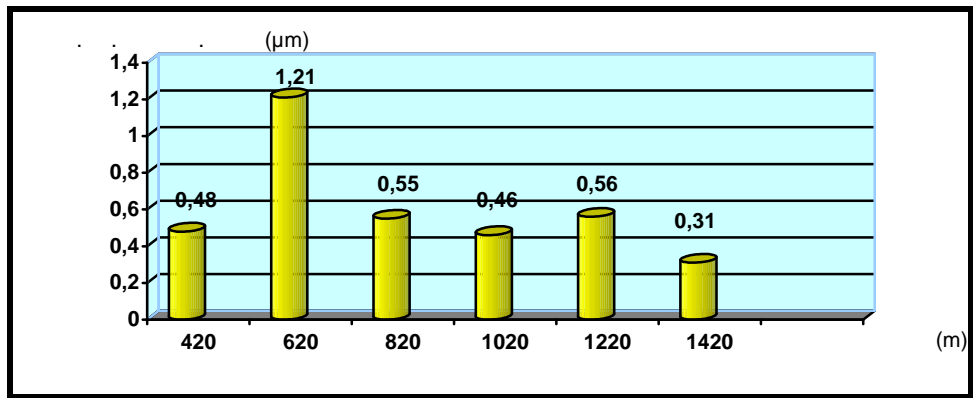
0.46 μ 0.56 μ , 1420

0.31 μ ( 7 52).



51.

(*Juniperus oxycedrus*)



52.

( p xy )

*Juniperus oxycedrus*

1020

(3.17 μ ),

1220

1420

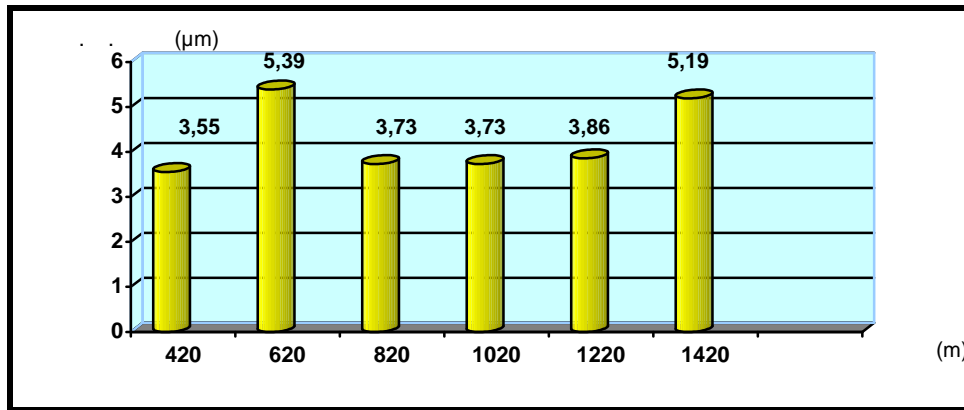
(3.86μ

5.19

μ )

7

53.

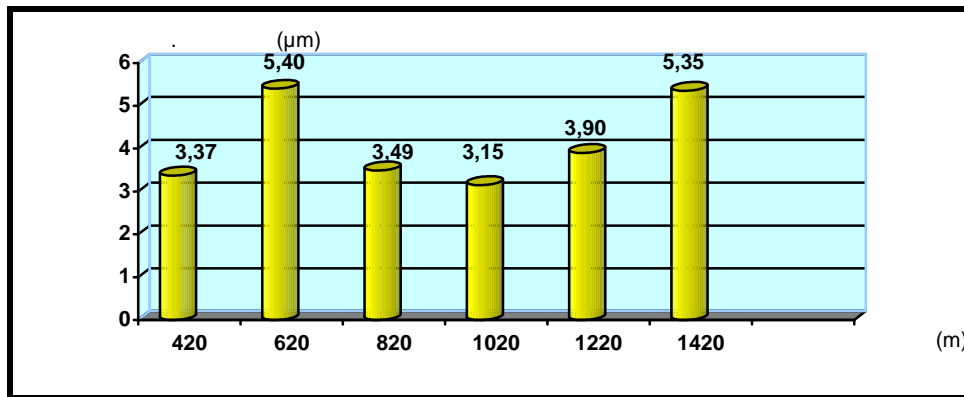


53. *Juniperus oxycedrus*

1020 (3.15 μ ),

1220 1420 (3.9 μ 5.35μ ), 7

54.



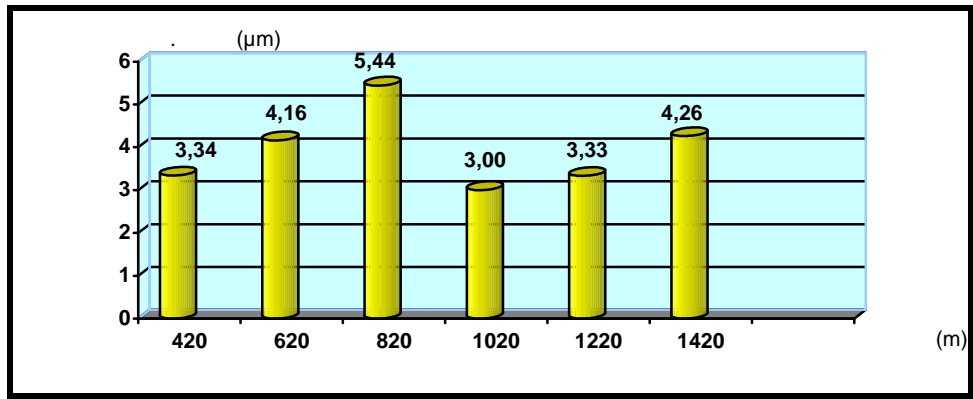
54. *Juniperus oxycedrus*

55 8,

*Juniperus oxycedrus* 1020

3.00 μ , , 1220 3.33 μ , 1420

4.26 μ .



55.

*oxycedrus* )

(*Juniperus*

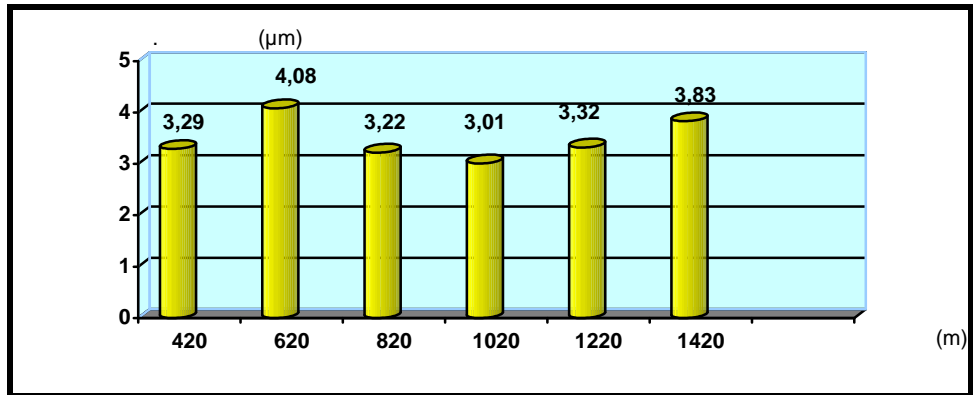
*Juniperus oxycedrus* ,

1020

(3.01 μ ),

1420 (3.83 μ ) ( 8

56).



56.

*oxycedrus* )

(*Juniperus*

*Juniperus oxycedrus*

420

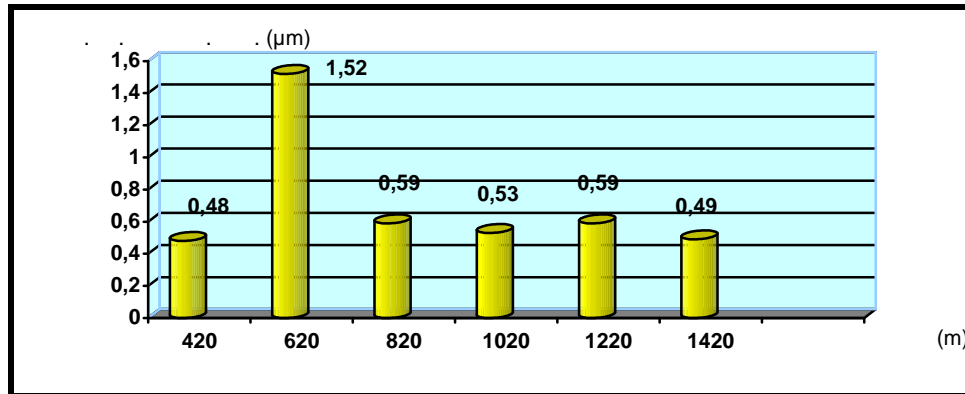
p 1420 ,

0.48  $\mu$

0.59  $\mu$

8

57.



57.

(*Juniperus oxycedrus*)



8.  
oxycedrus ).

(Juniperus

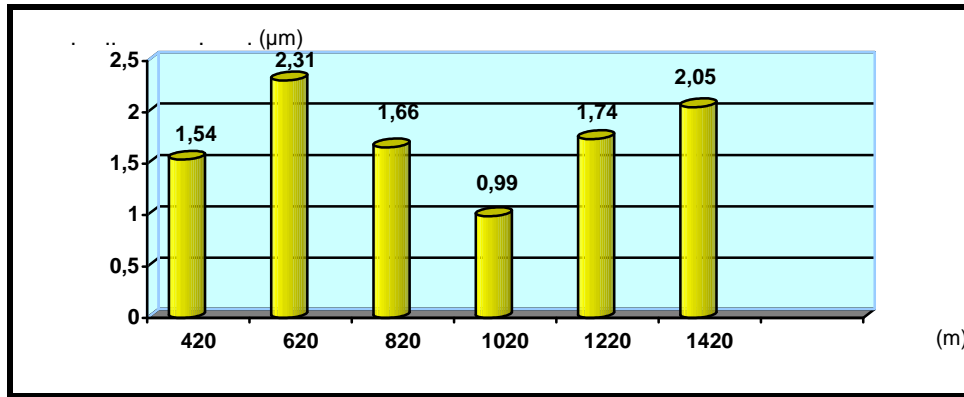
| ( ~ ) |           | ( )    |       |       |       |       |        |
|-------|-----------|--------|-------|-------|-------|-------|--------|
|       |           | 420    | 620   | 820   | 1020  | 1220  | 1420   |
|       | $\bar{X}$ | 3.34   | 4.16  | 5.44  | 3.00  | 3.33  | 4.26   |
|       |           | 2.49   | 1.66  | 2.49  | 1.66  | 1.66  | 2.08   |
|       | <b>x</b>  | 4.46   | 6.64  | 4.98  | 4.15  | 4.57  | 7.47   |
|       | $\bar{X}$ | 3.29   | 4.08  | 3.22  | 3.01  | 3.32  | 3.83   |
|       |           | 2.49   | 1.66  | 0.83  | 1.66  | 2.08  | 2.08   |
|       | <b>x</b>  | 4.57   | 5.81  | 5.39  | 4.15  | 4.15  | 7.47   |
|       | $\bar{X}$ | 74.04  | 107.7 | 72.95 | 63.96 | 64.95 | 125.45 |
|       |           | 49.80  | 85    | 55    | 36.52 | 49.80 | 60     |
|       | <b>x</b>  | 106.24 | 245   | 90    | 83    | 79.68 | 175    |
|       | $\bar{X}$ | 33.85  | 44.27 | 29.55 | 26.33 | 28.73 | 48.90  |
|       |           | 24.90  | 25    | 25    | 19.92 | 19.92 | 30     |
|       | <b>x</b>  | 41.50  | 55    | 40    | 33.20 | 34.86 | 75     |
|       | $\bar{X}$ | 1.54   | 1.52  | 0.59  | 0.53  | 0.59  | 0.49   |
|       |           | 0.415  | 0.415 | 0.415 | 0.415 | 0.415 | 0.415  |
|       | <b>x</b>  | 2.075  | 2.49  | 1.25  | 1.25  | 1.25  | 0.83   |
|       | $\bar{X}$ | 1.54   | 2.31  | 1.66  | 0.99  | 1.74  | 2.05   |
|       |           | 0.415  | 0.83  | 0.83  | 0.83  | 0.83  | 0.83   |
|       | <b>x</b>  | 2.09   | 3.32  | 2.90  | 1.66  | 2.49  | 4.15   |
|       | $\bar{X}$ | 21.98  | 41.50 | 23.90 | 17.40 | 25.07 | 33.13  |
|       |           | 13.28  | 15.15 | 14.94 | 11.62 | 16.60 | 19.92  |
|       | <b>x</b>  | 29.88  | 58.10 | 39.84 | 23.24 | 33.20 | 49.80  |
|       | $\bar{X}$ | 23.68  | 43.50 | 23.64 | 17.63 | 23.16 | 33.13  |
|       |           | 13.28  | 24.90 | 16.60 | 11.62 | 14.94 | 19.92  |
|       | <b>x</b>  | 33.22  | 74.70 | 39.84 | 24.90 | 33.20 | 49.80  |

( 8 58),  
1020

(0.99  $\mu$  ),

1420

2.05  $\mu$  .



58.

(*Juniperus oxycedrus*)

8 59,

1020 (63.96  $\mu$  ),

1420 (125.45  $\mu$  ).

p *Juniperus oxycedrus*

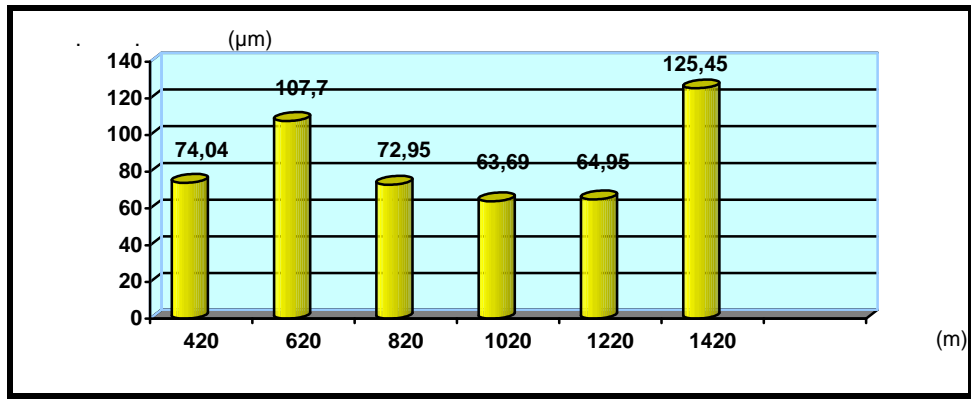
1020 (26.33

$\mu$  ),

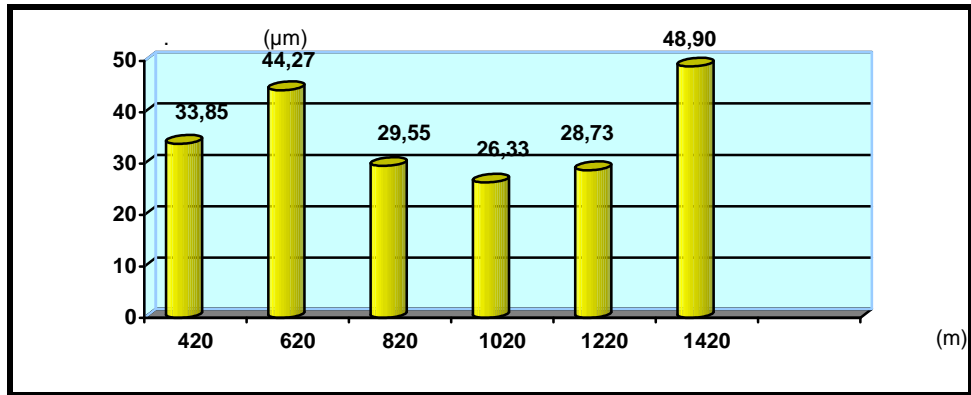
1420 (48.9  $\mu$  )

( 8 60).

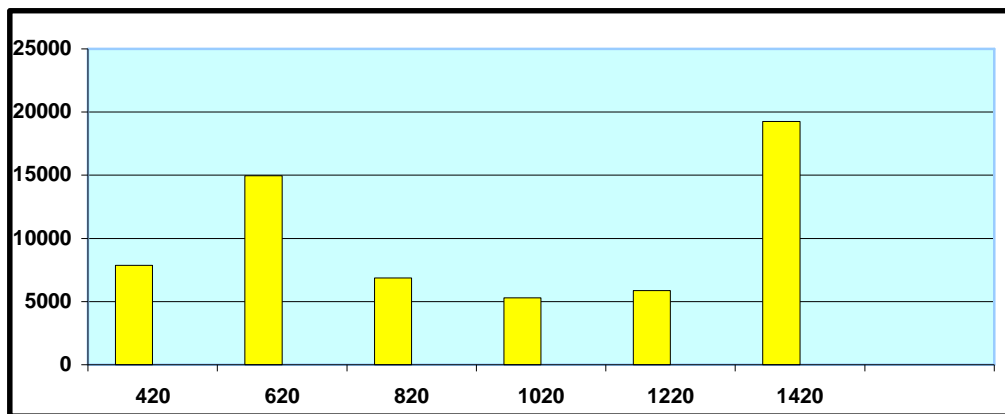
*Juniperus oxycedrus*



59. *(Juniperus oxycedrus)* p



60. *(Juniperus oxycedrus)*



61. *(Juniperus oxycedrus)*

*oxycedrus*

*Juniperus*

61.

(19262,34 $\mu^2$ ),

620

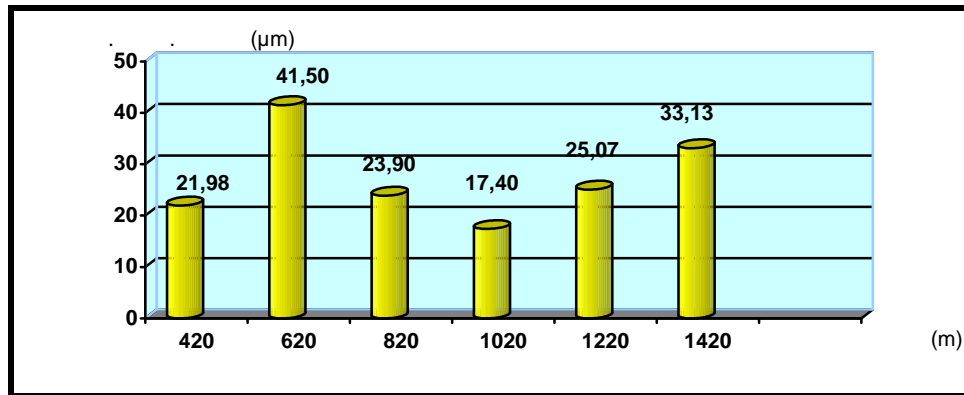
*Juniperus oxycedrus*

8

62 63.

1020 (17.4  $\mu$  17.63  $\mu$  ),

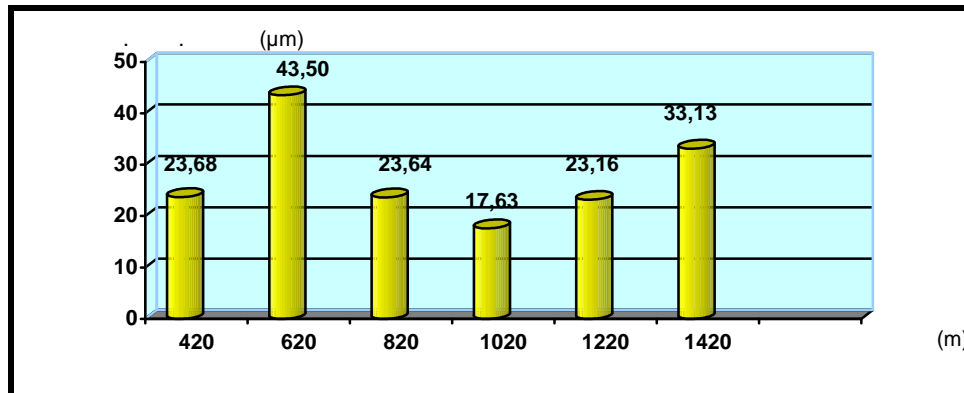
1420 (3.13  $\mu$  33.13  $\mu$  ).



62.

(*Juniperus*

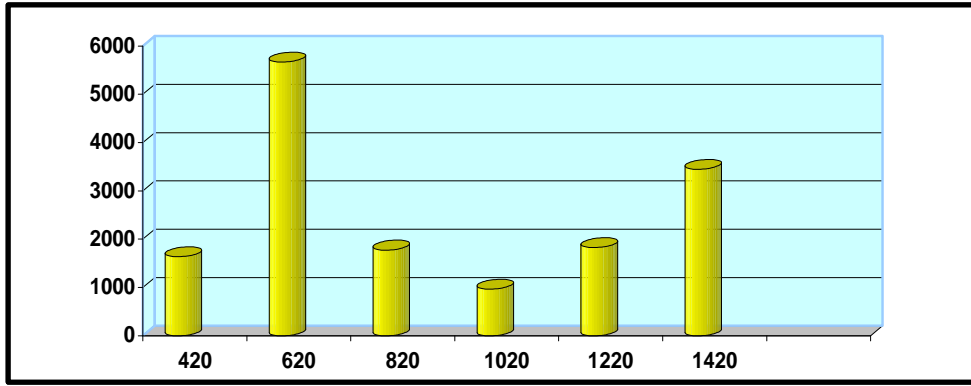
*oxycedrus* )



63.

(*Juniperus*

*oxycedrus* )



64.

(*Juniperus oxycedrus*)

64

*Juniperus oxycedrus.*

620

1420

1020

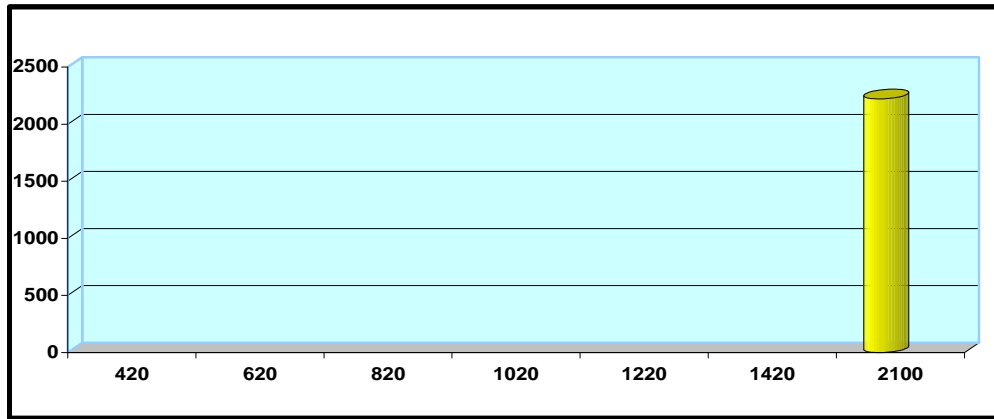
9.

*Juniperus sibirica.*

| (~ )     | $\bar{X}$ |       | $\bar{x}$ |
|----------|-----------|-------|-----------|
|          | 328.64    | 250   | 380       |
|          | 1.81      | 0.83  | 2.90      |
|          | 1.81      | 0.83  | 2.90      |
|          | 1.70      | 0.83  | 2.49      |
|          | 0.57      | 0.415 | 1.24      |
|          | 4.89      | 2.43  | 7.05      |
|          | 4.83      | 2.90  | 6.64      |
| <b>V</b> | 3.93      | 2.07  | 4.98      |
| <b>V</b> | 3.83      | 2.49  | 4.56      |
|          | 30.47     | 18.26 | 43.16     |
|          | 23.22     | 11.6  | 31.54     |
|          | 0.61      | 0.41  | 0.83      |
|          | 1.81      | 1.66  | 2.49      |
|          | 41.86     | 19.92 | 78.02     |
|          | 45.38     | 24.90 | 69.72     |
|          | 8.7       | 5     | 12        |

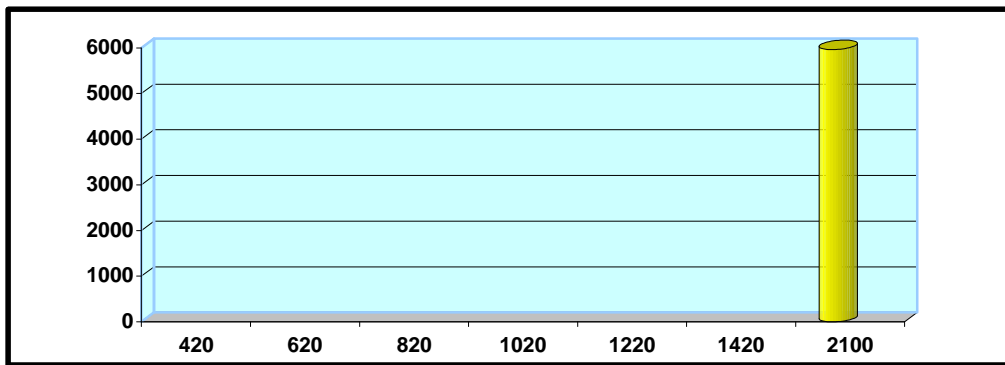
9

*Juniperus sibirica* 2100 .  
 , *Juniperus sibirica*  
 ( ), ( )  
 ( ) ,  
 , *Juniperus sibirica*.  
*Juniperus oxycedrus* 1420 .



65. (*Juniperus sibirica*) 2100

*Juniperus sibirica* 2100



66. (*Juniperus sibirica*) 2100 m

*Juniperus sibirica.*

*Juniperus oxycedrus*

*Juniperus communis*

**4. 2. 3.**

*Juniperus oxycedrus Juniperus sibirica*

*Juniperus communis,*

10 11

67, 68 69.

10

*oxycedrus.*

67,

*Juniperus communis,*

11 *Juniperus*

68 69

*Juniperus communis*

*Juniperus oxycedrus.*

10

*Juniperus communis,*

620 (110.96)

(1420 ),

1220 , (150.43).

133.64.

420 (25.51 μ ),

620 (18 μ ).

( 620 ),

1420

(21.23 μ ).

*Juniperus communis,*

10

620 (5.75 μ ),

1220 (6.11 μ ).

10.  
(*Juniperus communis*).

| .    |      |           |       |       | (~ ) |           |       |       | (~ ) |           |      |      |
|------|------|-----------|-------|-------|------|-----------|-------|-------|------|-----------|------|------|
|      | .( ) | $\bar{X}$ |       | x     |      | $\bar{X}$ |       | x     |      | $\bar{X}$ |      | x    |
| 420  | 100  | 140.0     | 117.1 | 183.4 | 100  | 25.51     | 24.59 | 26.23 | 100  | 5.96      | 3.75 | 8.26 |
| 620  | 100  | 110.9     | 103.0 | 117.5 | 100  | 18.60     | 17.18 | 20.29 | 100  | 5.75      | 3.69 | 7.92 |
| 820  | 100  | 134.1     | 98.62 | 180.3 | 100  | 18.52     | 13.86 | 21.65 | 100  | 6.01      | 3.78 | 8.41 |
| 1020 | 100  | 135.0     | 102.2 | 182.2 | 100  | 18.88     | 18.07 | 20.62 | 100  | 5.95      | 3.81 | 8.25 |
| 1220 | 100  | 150.4     | 117.6 | 181.2 | 100  | 19.15     | 16.57 | 21.03 | 100  | 6.11      | 3.81 | 8.59 |
| 1420 | 100  | 133.6     | 106.5 | 170.8 | 100  | 21.23     | 19.60 | 23.34 | 100  | 5.78      | 3.72 | 7.92 |

11.  
(*Juniperus oxycedrus*).

| .    |      |           |       |       | (~ ) |           |       |       | (~ ) |           |      |      |
|------|------|-----------|-------|-------|------|-----------|-------|-------|------|-----------|------|------|
|      | .( ) | $\bar{X}$ |       | x     |      | $\bar{X}$ |       | x     |      | $\bar{X}$ |      | x    |
| 420  | 100  | 153.6     | 128.6 | 189.2 | 100  | 16.04     | 10.74 | 22.44 | 100  | 6.12      | 3.11 | 8.99 |
| 620  | 100  | 162.5     | 120.8 | 213.6 | 100  | 15.14     | 12.05 | 18.06 | 100  | 6.80      | 4.19 | 9.48 |
| 820  | 100  | 152.1     | 103.3 | 211.0 | 100  | 20.07     | 16.44 | 24.42 | 100  | 5.88      | 3.76 | 8.04 |
| 1020 | 100  | 160.0     | 117.3 | 209.4 | 100  | 25.93     | 23.88 | 29.13 | 100  | 5.89      | 3.69 | 8.16 |
| 1220 | 100  | 123.0     | 112.8 | 141.1 | 100  | 15.86     | 12.79 | 20.29 | 100  | 7.07      | 4.53 | 9.57 |
| 1420 | 100  | 162.4     | 103.5 | 224.9 | 100  | 22.49     | 15.44 | 29.08 | 100  | 6.62      | 4.00 | 9.43 |

*Juniperus oxycedrus*

11.

1220 (123.06),  
620 (162.51) 1420 (162.48) .

*Juniperus oxycedrus*

620 (15.14  $\mu$  ), 1020  
(25.93  $\mu$  ).

*Juniperus oxycedrus* ( 11)



1220 (7.07 μ ), 830 . . (5. 88 μ ).

*Juniperus communis*  
*Juniperus oxycedrus* 67, 68 69. 67

*Juniperus sibirica*.

, 67 *Juniperus oxycedrus*

*Juniperus communis*

, 1220 . *Juniperus sibirica*

1420 , 15 20

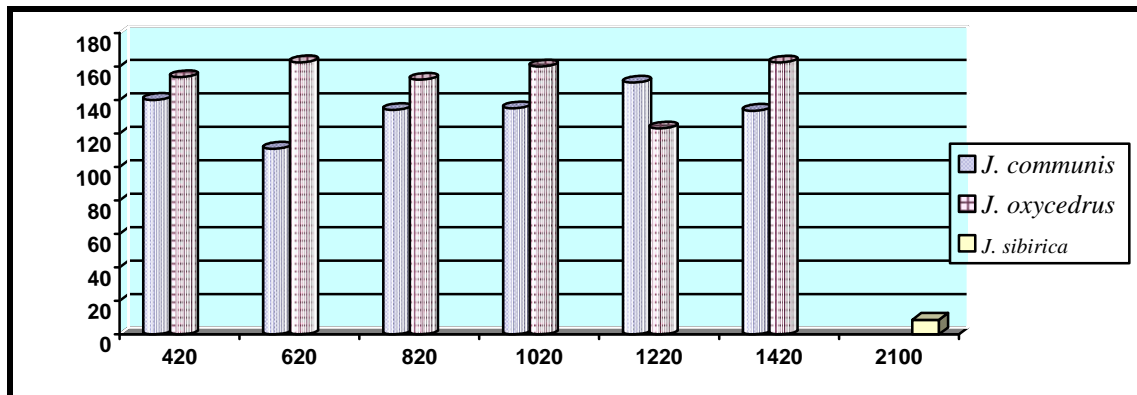
.

*Juniperus communis*

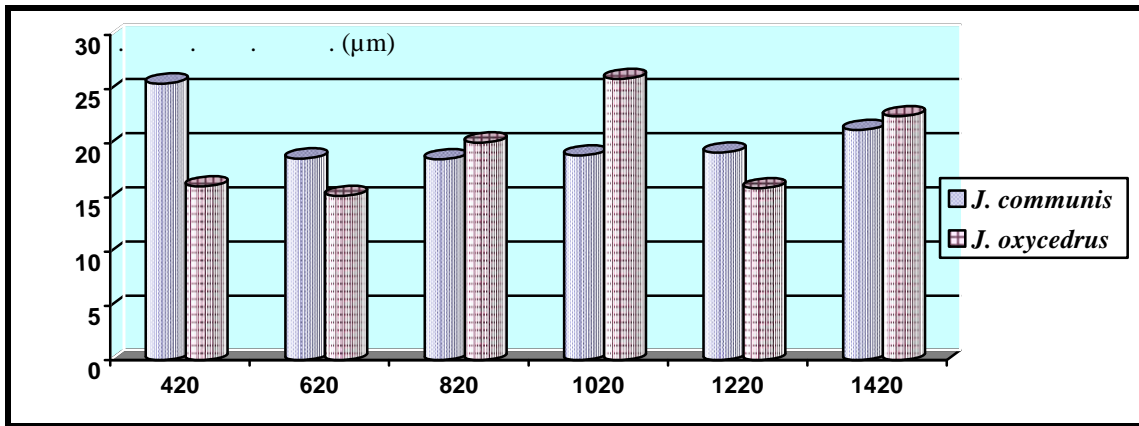
(420 620 ), (820 1020 ),

(1420 ), *Juniperus oxycedrus*

( 68).

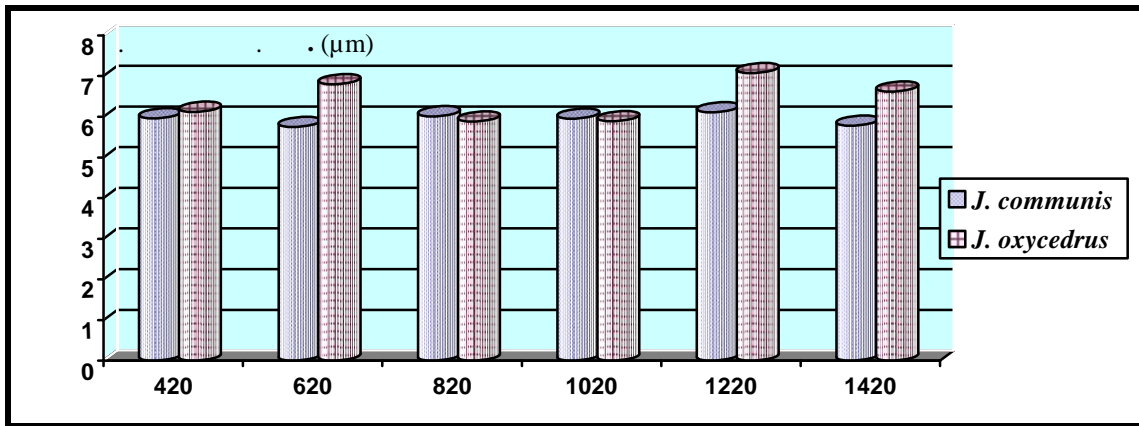


67.  
 (*Juniperus communis*, *Juniperus oxycedrus* *Juniperus sibirica*)



68.

(*Juniperus communis* *Juniperus oxycedrus*)



69.

(*Juniperus communis* *Juniperus oxycedrus*)

( 69)

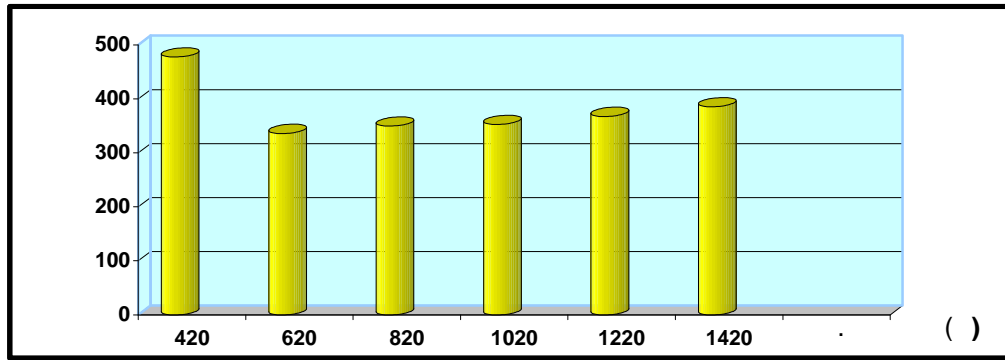
*Juniperus oxycedrus*

(820 1020 ),  
*communis*.

*Juniperus*

*Juniperus communis* *Juniperus oxycedrus*

( 70 71).



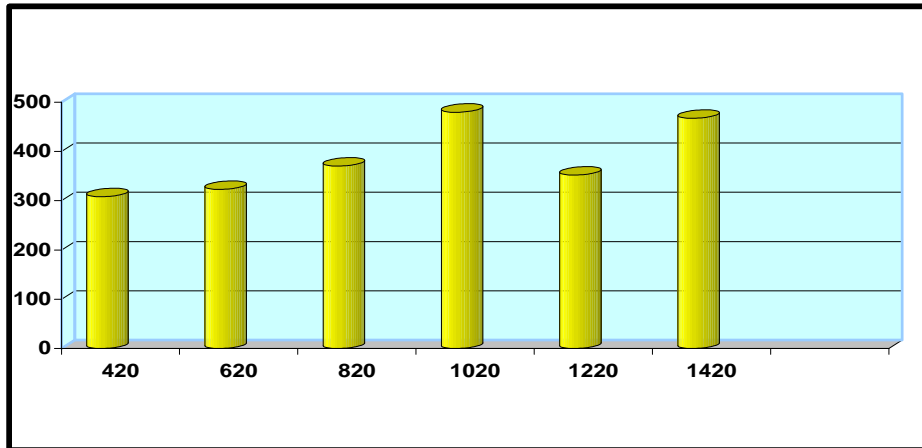
70.

(*Juniperus communis*)

70

*Juniperus communis.*

420 (477,4  $\mu^2$ ),

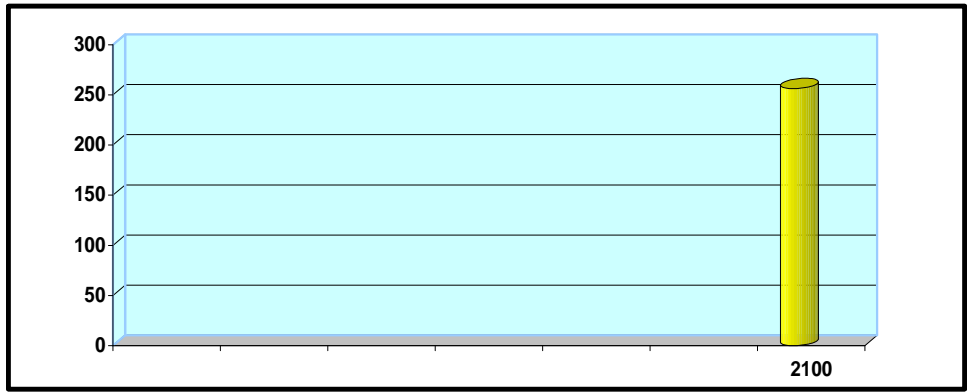


71.

(*Juniperus oxycedrus*)

71

1020 1420



72. 2100 (*Juniperus sibirica*)

( 72) *Juniperus sibirica*

2100

4. 2. 4. ( V )

- ( V )

*Juniperus communis* *Juniperus oxycedrus*,

V 12

13. I 12 p

*Juniperus communis*

13 p (*Juniperus*

*oxycedrus*)

12. V  
(*Juniperus communis*).

|   | ( 1,2) | p         |
|---|--------|-----------|
|   | 444.52 | 0.000 *** |
|   | 349.84 | 0.000 *** |
|   | 49.72  | 0.000 *** |
|   | 43.25  | 0.000 *** |
|   | 134.76 | 0.000 *** |
|   | 52.10  | 0.000 *** |
|   | 308.25 | 0.000 *** |
|   | 309.44 | 0.000 *** |
| V | 36.03  | 0.000 *** |
| V | 51.11  | 0.000 *** |
|   | 49.89  | 0.000 *** |
|   | 93.02  | 0.000 *** |
|   | 46.02  | 0.000 *** |
|   | 360.69 | 0.000 *** |

13. V  
(*Juniperus oxycedrus* ).

|   | ( 1,2) | p         |
|---|--------|-----------|
|   | 291.34 | 0.000 *** |
|   | 203.92 | 0.000 *** |
|   | 21.48  | 0.000 *** |
|   | 115.43 | 0.000 *** |
|   | 38.10  | 0.000 *** |
|   | 212.99 | 0.000 *** |
|   | 86.50  | 0.000 *** |
|   | 94.65  | 0.000 *** |
| V | 41.52  | 0.000 *** |
| V | 31.33  | 0.000 *** |
|   | 161.94 | 0.000 *** |
|   | 74.16  | 0.000 *** |
|   | 162.19 | 0.000 *** |
|   | 302.29 | 0.000 *** |

4. 2. 3.

( )

(*Juniperus communis* *Juniperus oxycedrus* )

, 14, 15 16.  
14

, *Juniperus communis*,

p 89,7%

( ) ( p ).

5,6%

95,3%

)

98,2%

( )

( ). ,

14.

(*Juniperus communis*)

|      | V 1           | V 2           | V 3           |
|------|---------------|---------------|---------------|
|      | -0.222        | -0.059        | 0.296         |
|      | -0.256        | 0.019         | 0.013         |
|      | -0.116        | 0.139         | -0.206        |
|      | 0.099         | 0.330         | 0.250         |
|      | -0.221        | -0.218        | 0.091         |
|      | 0.005         | <b>-0.605</b> | 0.251         |
|      | <b>-0.526</b> | -0.149        | <b>-0.510</b> |
|      | -0.321        | 0.121         | <b>-0.470</b> |
| V    | 0.152         | 0.223         | 0.164         |
| V    | -0.015        | -0.021        | 0.266         |
|      | -0.277        | -0.379        | -0.100        |
|      | -0.288        | 0.333         | 0.259         |
|      | 0.003         | -0.178        | 0.139         |
|      | <b>-0.421</b> | 0.087         | 0.210         |
|      | 12.391        | 0.772         | 0.404         |
| . p. | 89.7%         | 95.3%         | 98.2%         |

*Juniperus oxycedrus*

15. I

69, 3%  
 : ( )  
 ), ( )  
 ). 88,3%  
 , ( )  
 ), ( )  
 ( ).  
 96,5%  
 : ( ),  
 ( ), ( )  
 ( ).

15.

(*Juniperus oxycedrus*)

|      | V 1           | V 2           | V 3           |
|------|---------------|---------------|---------------|
|      | <b>-0.608</b> | -0.282        | <b>0.881</b>  |
|      | 0.356         | 0.217         | -0.236        |
|      | -0.069        | -0.072        | 0.189         |
|      | -0.222        | <b>-0.426</b> | <b>0.579</b>  |
|      | 0.003         | 0.034         | 0.027         |
|      | <b>-0.568</b> | <b>0.470</b>  | 0.082         |
|      | -0.070        | -0.049        | -0.116        |
|      | -0.131        | -0.019        | -0.155        |
| V    | 0.000         | -0.078        | -0.057        |
| V    | -0.016        | 0.020         | 0.009         |
|      | -0.337        | <b>0.581</b>  | 0.110         |
|      | -0.056        | -0.102        | 0.239         |
|      | -0.071        | -0.328        | <b>-0.511</b> |
|      | <b>-0.405</b> | -0.019        | <b>-0.790</b> |
|      | 6.413         | 1.762         | 0.764         |
| . p. | 69.3%         | 88.3%         | 96.5%         |

*Juniperus communis Juniperus oxycedrus*

16. 55,1% ( ).

81,7% ( ), ( ) ( ).

92,4% ( ).

16. *Juniperus communis* (*Juniperus oxycedrus*),

|      | V 1           | V 2           | V 3          |
|------|---------------|---------------|--------------|
|      | <b>-0.461</b> | <b>-0.409</b> | -0.220       |
|      | 0.078         | 0.329         | -0.051       |
|      | -0.088        | -0.095        | -0.064       |
|      | -0.264        | <b>-0.559</b> | -0.282       |
|      | 0.002         | 0.399         | 0.007        |
|      | -0.386        | -0.113        | <b>0.700</b> |
|      | -0.197        | <b>0.504</b>  | -0.086       |
|      | -0.118        | <b>0.448</b>  | -0.121       |
| V    | -0.022        | -0.182        | -0.056       |
| V    | -0.041        | -0.028        | -0.051       |
|      | -0.225        | 0.178         | <b>0.488</b> |
|      | -0.132        | 0.197         | -0.107       |
|      | -0.017        | -0.068        | 0.040        |
|      | -0.393        | -0.064        | 0.109        |
|      | 7.300         | 3.516         | 1.412        |
| . p. | 55.1%         | 81.7%         | 92.4%        |

*Juniperus communis* *Juniperus oxycedrus*

( )



( 73, 74, 75

76).

*Juniperus communis*

( 73),

620

420

420

820

1220

( 74),

*Juniperus communis*

1220

:

*Juniperus communis*

(420 620 ),

p

820 , 1020

, 1220 1420

*Juniperus oxycedrus,*

( 76 76),

*Juniperus communis.*

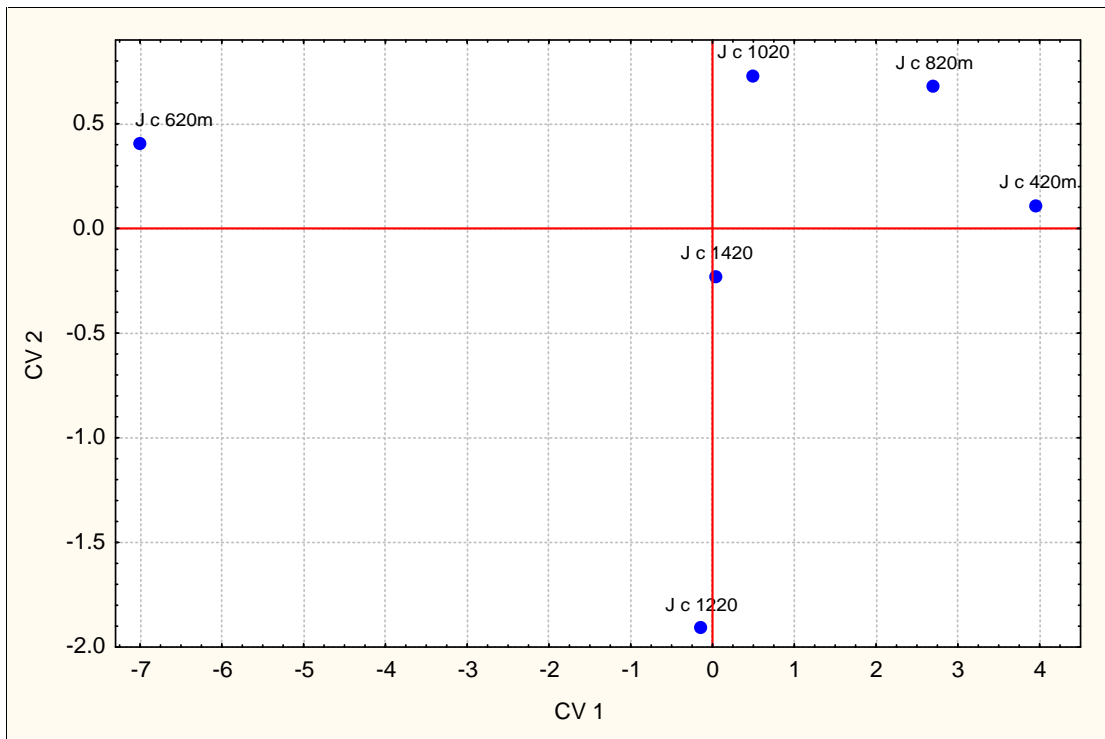
( 75),

620

420

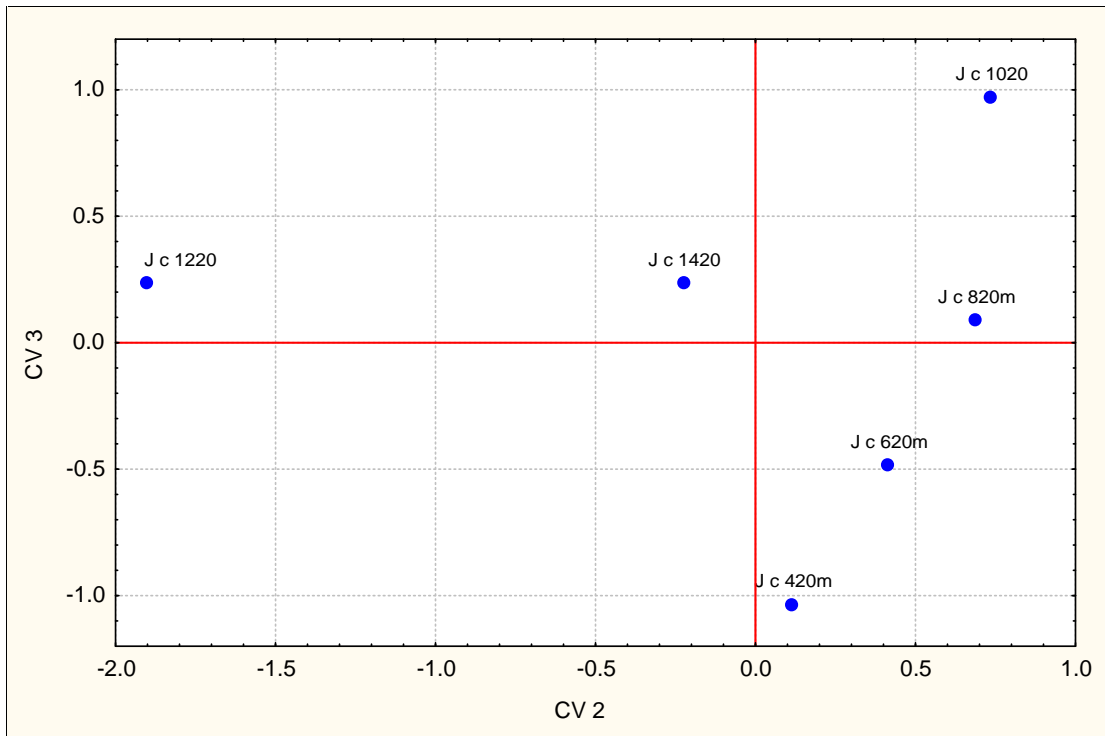
1420

( 76)



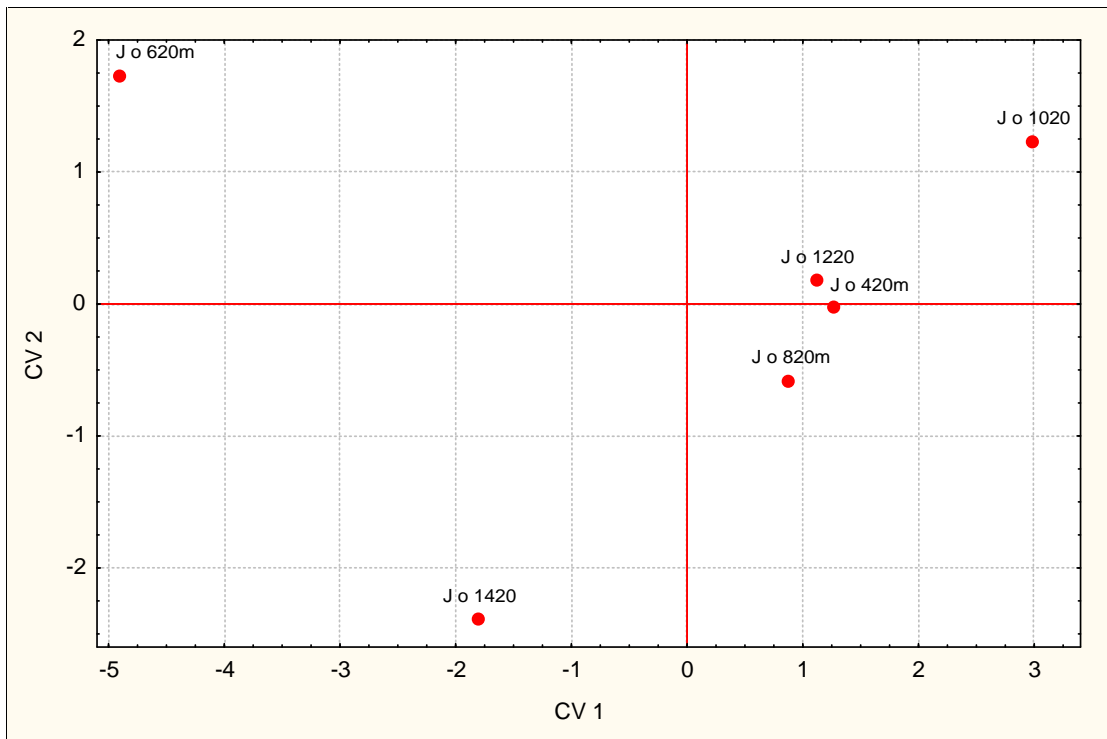
73.

(*Juniperus communis*)



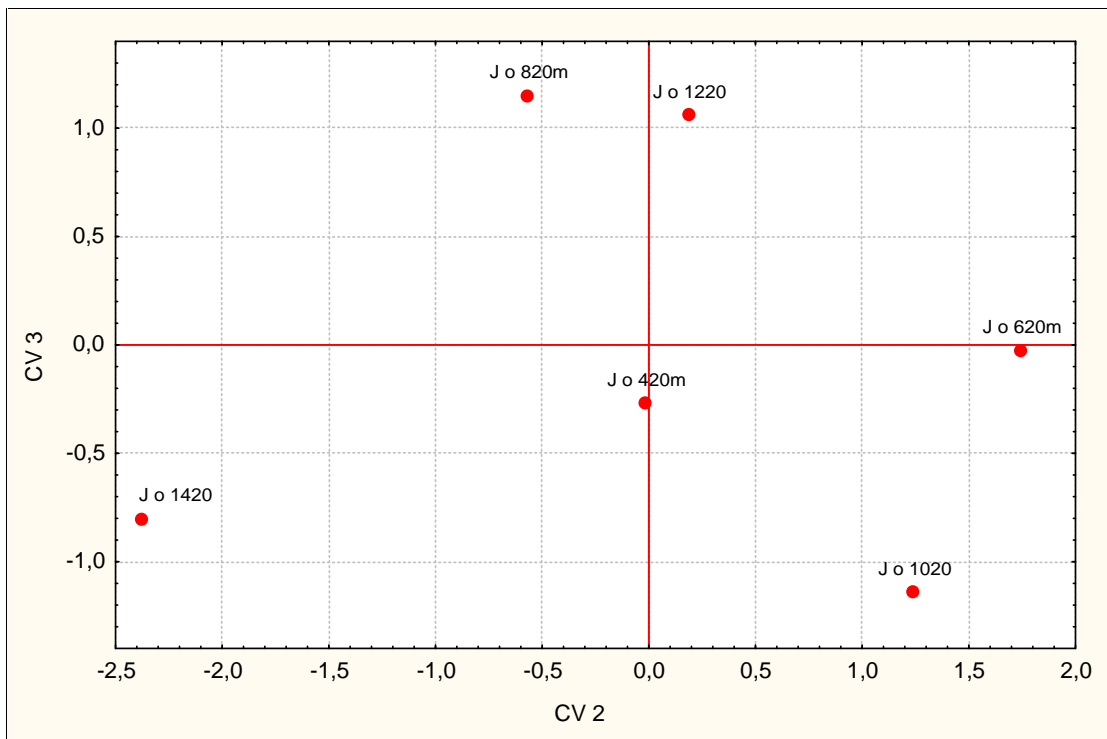
74.

(*Juniperus communis*)



75.

*(Juniperus oxycedrus)*



76.

*(Juniperus oxycedrus)*

*Juniperus communis*

*Juniperus oxycedrus*

( 77 78). 77

620

, *Juniperus oxycedrus* 1420 .

( 78.)

(

*Juniperus oxycedrus*,

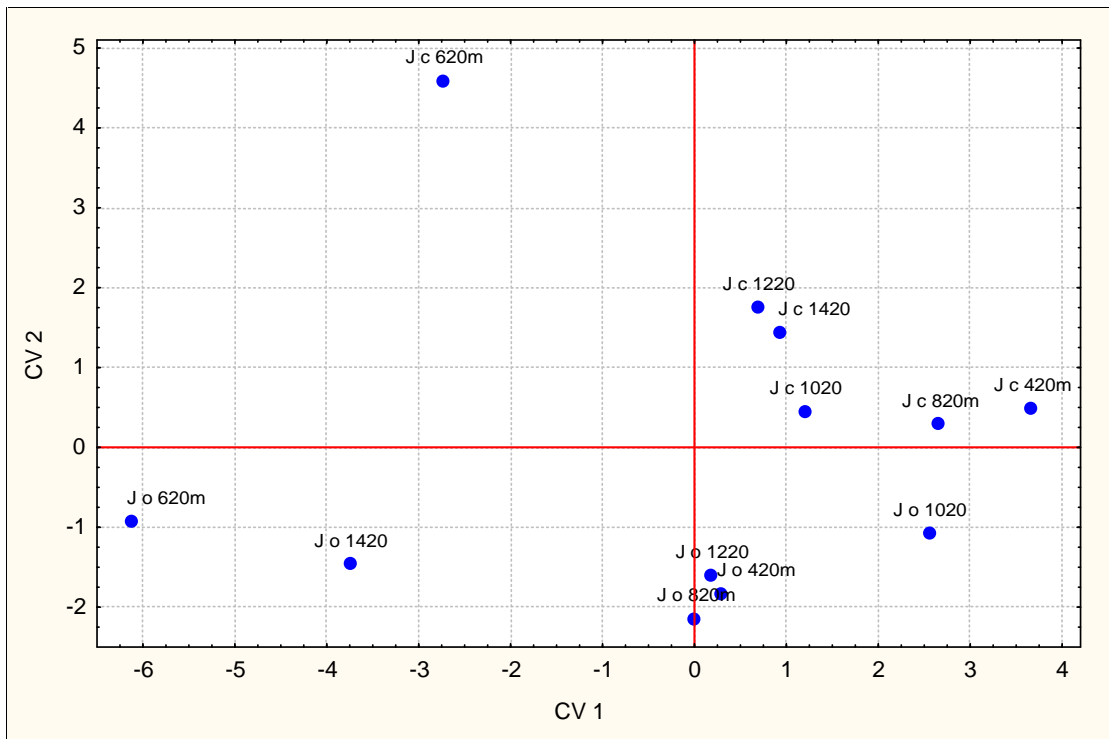
*Juniperus communis* .

(

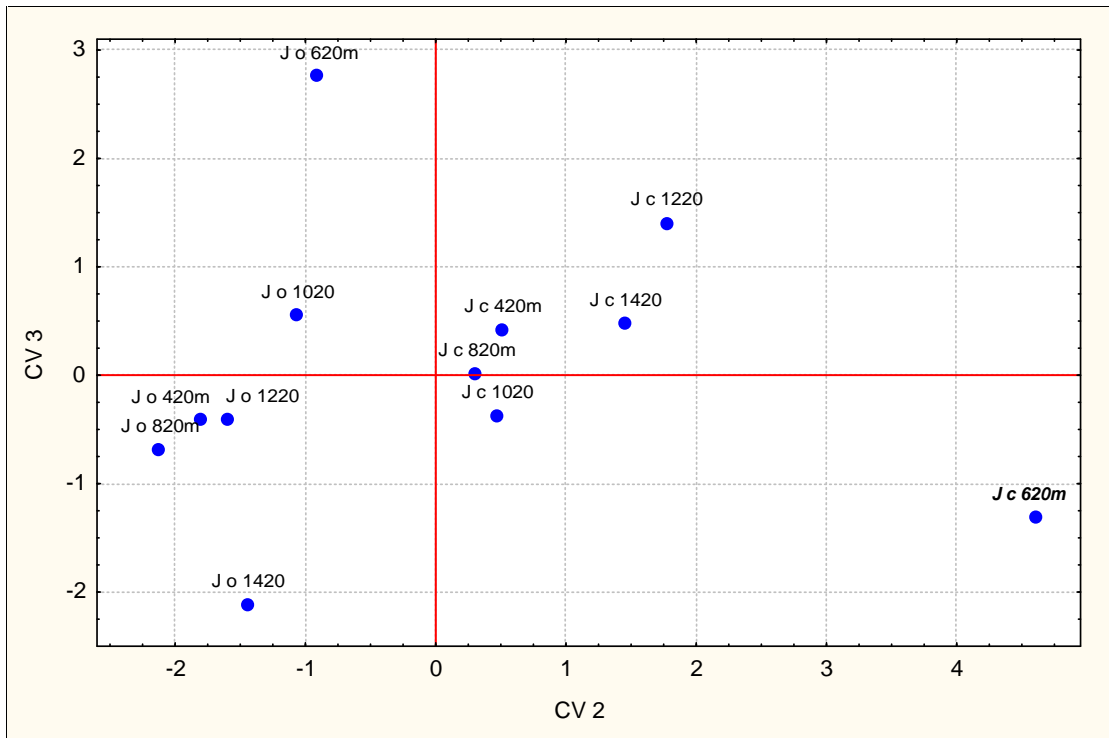
) p .

: ( ), ( ),

( ) ( ).



77. *Juniperus communis* (*Juniperus oxycedrus*),



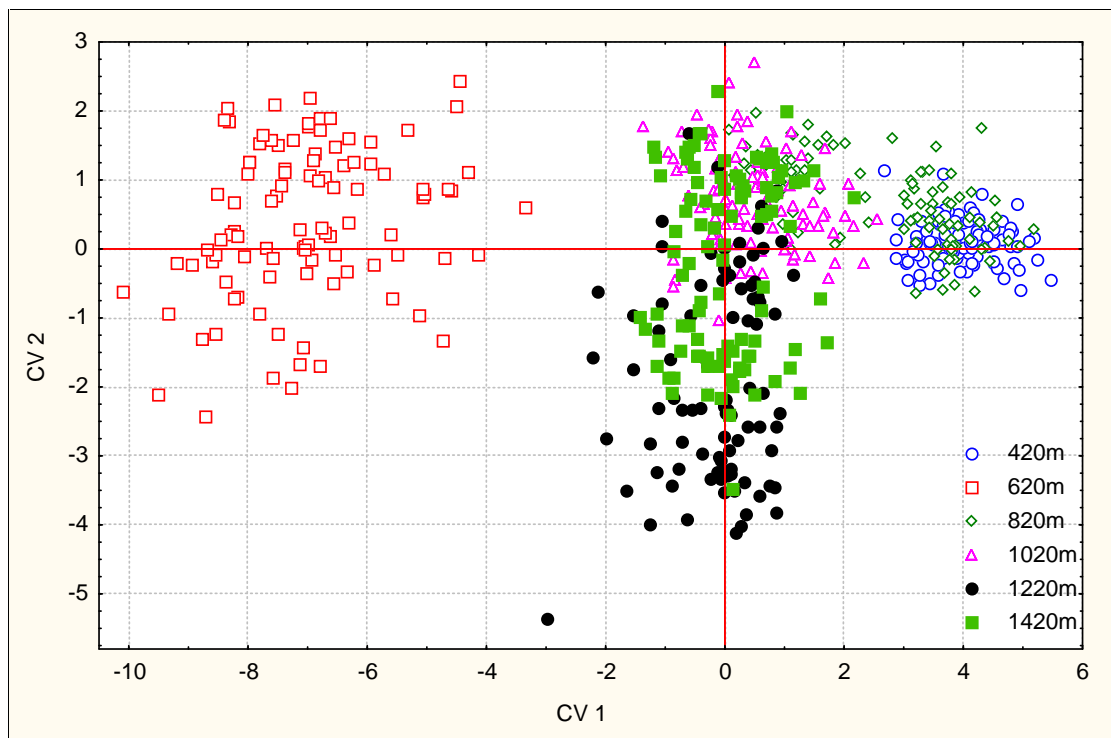
78. *Juniperus communis* (*Juniperus oxycedrus*),

*Juniperus communis* ( 79) ,

620

420

820 ,



79.

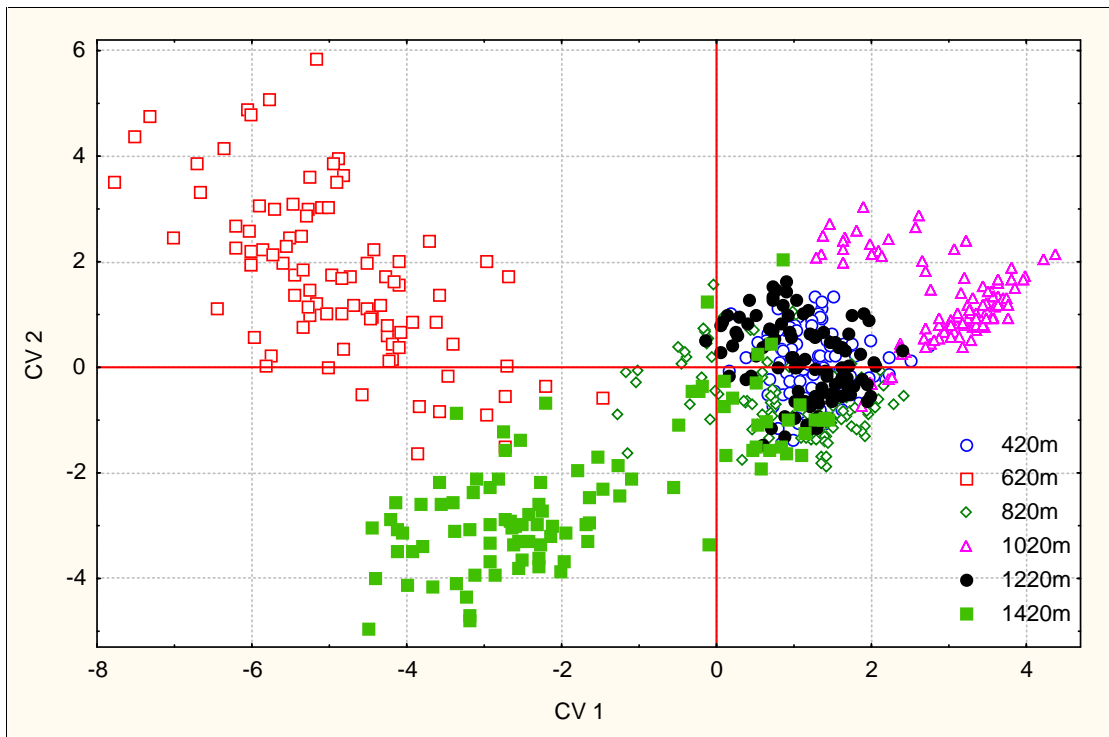
(*Juniperus communis*)

*Juniperus oxycedrus* ( 80)

620

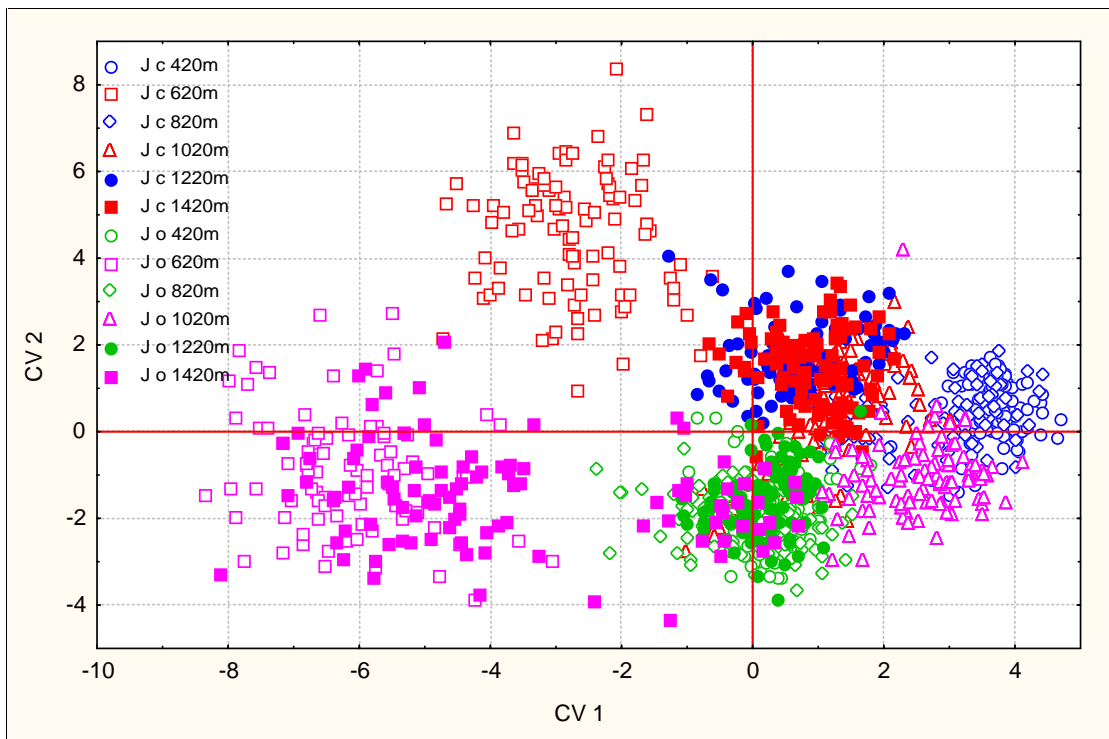
1020

1420 ,



80.

(*Juniperus oxycedrus*)



81.

*communis* *Juniperus oxycedrus*,

, *Juniperus*

*Juniperus communis*    *Juniperus oxycedrus*

620

1420    *Juniperus oxycedrus*,

*Juniperus communis*    *Juniperus oxycedrus*

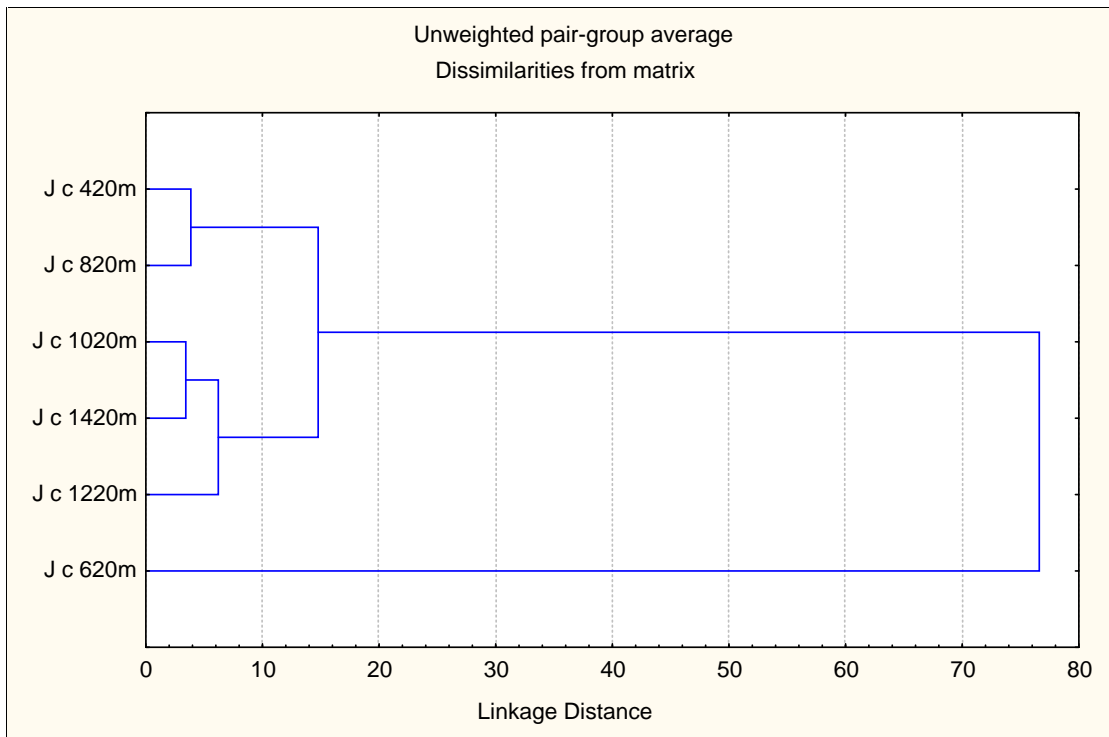
( 82, 83 84).    83

*Juniperus communis* .

620 .

:    (420 820 )

(1020 , 1220 1420 ).



82.

(*Juniperus communis*)



, *Juniperus oxycedrus*,

620 ( 83).

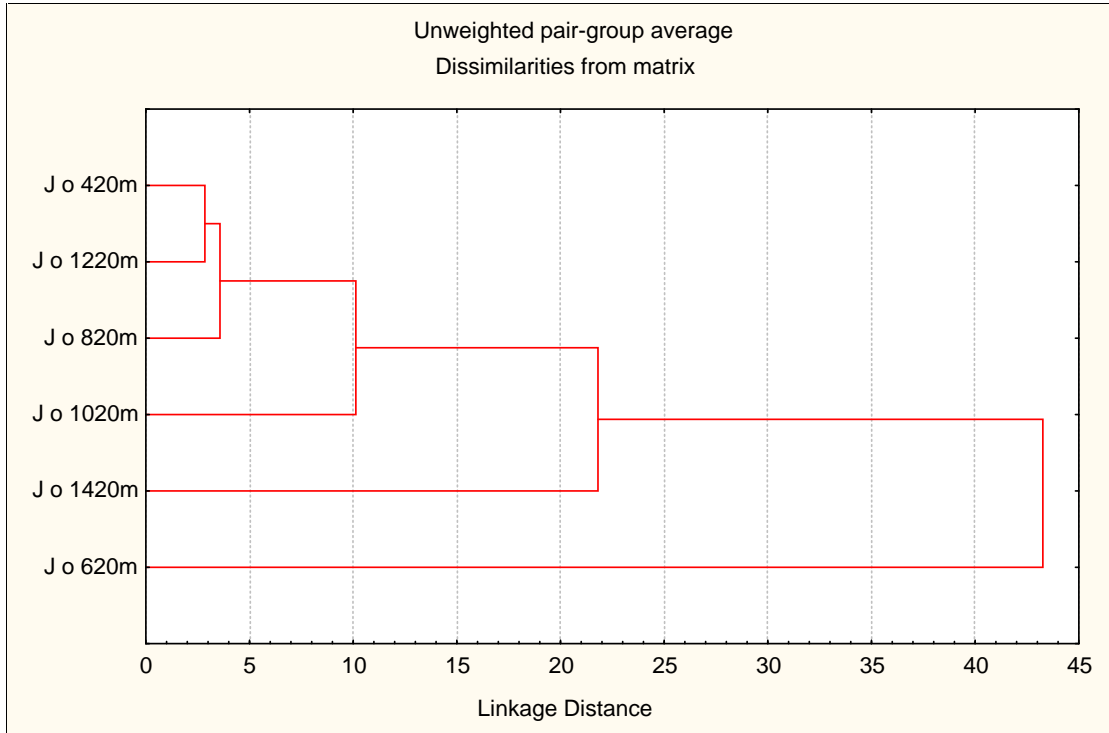
420 1220

820 ,

1020 1420 .

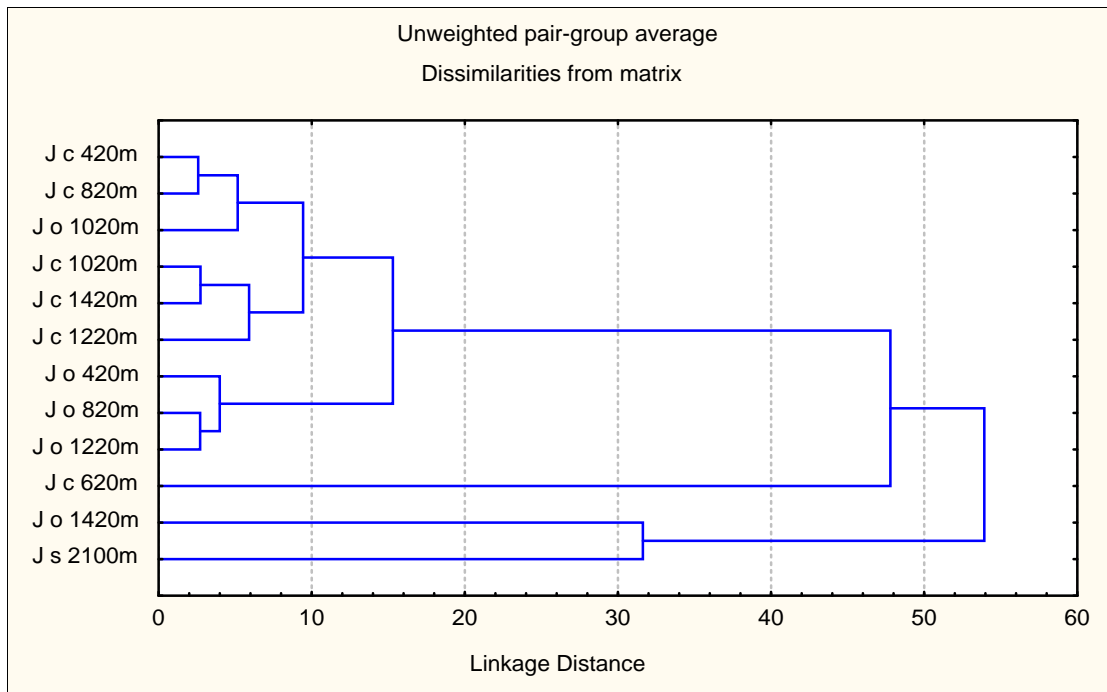
, *Juniperus oxycedrus*

*Juniperus communis*.



83.

(*Juniperus oxycedrus*)



84.

, *Juniperus communis*, *Juniperus oxycedrus* *Juniperus sibirica*

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*Juniperus communis*, *Juniperus oxycedrus* *Juniperus sibirica*,

( 84)

*Juniperus oxycedrus* 1420

*Juniperus*

*sibirica* 2100 .

*Juniperus communis* 620

,

*Juniperus communis* 420 820 ,

*Juniperus oxycedrus* 1020 .

*Juniperus*

*communis* 1020, 1220 1420 ,

*Juniperus oxycedrus* 420, 820 1220 .

(*Juniperus communis*, *Juniperus oxycedrus* i *Juniperus sibirica*)

( 420 1420, 2100 ). *Juniperus communis* *Juniperus*  
*oxycedrus* 420  
1420 , *Juniperus sibirica* 2100

*Juniperus communis*, *Juniperus oxycedrus* i *Juniperus sibirica*,

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*Juniperus communis* *Juniperus oxycedrus*  
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(420),  
1420 .  
, (1420 )  
,  
*Juniperus sibirica* ,  
*Juniperus communis* *Juniperus oxycedrus*

*Juniperus communis*    *Juniperus oxycedrus*

(Hovenden    Vander Schoor, 2006), kod Pinus (Jinxing Lin  
, 2001), Quercus (    , 1994.), Abies (Ballian D., Abaravdi A. 2005).

(ANOVA)

*Juniperus oxycedrus*    *Juniperus sibirica*    *Juniperus communis*,  
ANOVA

*Pinus*

., (Nadya Wahida,b    2006.).

(DCA)

*Juniperus communis, Juniperus oxycedrus Juniperus*  
*sibirica* ,  
.  
*Juniperus sibirica* 2100 ,  
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*Juniperus sibirica* *Juniperus sibirica*  
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, *Juniperus communis*  
1420 , . ,  
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*Juniperus sibirica* *Juniperus*  
*communis* 1420 . *Juniperus communis Juniperus*  
*oxycedrus* . *Juniperus oxycedrus* 820  
1020 *Juniperus*  
*communis* .

*Juniperus oxycedrus* , *Juniperus communis* 620 .

420 , *Juniperus communis*, *Juniperus oxycedrus* , *Juniperus sibirica*

1020 a . *Juniperus sibirica*

2100 , .

*Juniperus communis* *Juniperus oxycedrus*

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620 , ,

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620

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, (**Jinxing Lin** , 2001),

(**Thomas**

., 2007). *Juniperus*, , ,

( ), .

, (I. T. Kishchenko and I. V. Vantenkova 2006.) ,

(Wahid, 2006).

|                            |                            |                           |                           |
|----------------------------|----------------------------|---------------------------|---------------------------|
|                            |                            |                           | <i>Juniperus communis</i> |
| <i>Juniperus oxycedrus</i> |                            |                           |                           |
| <i>oxycedrus</i>           | 1020                       |                           | <i>Juniperus</i>          |
|                            | 620                        |                           |                           |
| <i>Juniperus sibirica</i>  |                            | 2100                      |                           |
|                            |                            |                           | <i>Juniperus</i>          |
| <i>communis</i>            | <i>Juniperus oxycedrus</i> |                           |                           |
|                            |                            |                           | <i>Juniperus</i>          |
| <i>oxycedrus</i>           |                            | 820                       |                           |
|                            |                            | 620                       |                           |
|                            |                            | <i>Juniperus sibirica</i> |                           |
|                            |                            |                           | <i>Juniperus communis</i> |
| <i>Juniperus oxycedrus</i> |                            |                           |                           |
|                            |                            |                           |                           |
| <i>Juniperus communis</i>  |                            |                           |                           |
|                            |                            |                           |                           |
|                            | 1020                       |                           |                           |

1420

620

*Juniperus oxycedrus*

1420

*Juniperus sibirica,*

*Juniperus communis Juniperus oxycedrus.*

*Juniperus communis Juniperus oxycedrus*

620

*Pinus*

(Chiou-Rong Sheue, 2003; Liu, 1990; Wu Hu, 1997; Kwei Lee, 1963), *Quercus*, (, 2003.), Ba i, T. (1982)., *Pinus* (Chiou-Rong Sheue 2003)., *Pinus* (, 1999.).

*Juniperus communis*

*Juniperus oxycedrus*

*Juniperus sibirica,*

*Juniperus communis.*

*Juniperus*

*oxycedrus*

*Juniperus communis*

, *Juniperus sibirica,*

20

(*Juniperus communis*, 420 ),



(*Juniperus communis*, 620 ),

(*Juniperus oxycedrus*, 620 ).

( , 1999; , 1957). *Pinus*

**(ANOVA)**

- (ANOVA),

**(DCA)**

*Juniperus communis Juniperus oxycedrus*

, *Juniperus oxycedrus* .

*Juniperus communis* *Juniperus oxycedrus*  
620  
620  
*Juniperus*  
*oxycedrus* 1420  
UPG A  
620  
*Juniperus communis* *Juniperus oxycedrus*  
*Juniperus*  
*oxycedrus* 1420  
*Juniperus sibirica*  
” “  
*Juniperus sibirica*  
*Juniperus oxycedrus* 1420  
( , )  
, *Juniperus communis*, *Juniperus*  
*oxycedrus Juniperus sibirica*,  
2100  
*Juniperus*

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## 5.

(*Juniperus communis*, *Juniperus oxycedrus* i *Juniperus sibirica*)

1. , :
2. , .  
ANOVA,
3. *Juniperus communis*, *Juniperus oxycedrus* *Juniperus sibirica* .
4. , *Juniperus communis* *Juniperus oxycedrus*,  
620 ,  
*Juniperus communis*  
*Juniperus oxycedrus* 620  
*Juniperus communis*  
620 , *Juniperus oxycedrus*,  
1420 . *Juniperus sibirica* .  
*Juniperus communis* *Juniperus oxycedrus* 620  
 ,  
 , *Juniperus sibirica*,

*Juniperus oxycedrus*.

5. - (ANOVA) ,

6.

*Juniperus communis* *Juniperus oxycedrus*

620

UPG A

7.

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APENDIX



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820



1020



1220



1420



2100

