

# INCREASE THE LIVING LONGER OF SOME SHRUB SPECIES OF BILA TSEKVA REGION BY PERIODIC TRIMMING

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*The peculiarities of increasing of age, forestry and ornamental qualities of eight shrubby species in the green belt of Bila Tserkva city and in the forests of Tomylivka district of "Bila Tserkva Forestry " holding "rejuvenation" – periodic trimming their aerial parts are investigated. Established that clipping crowns shrubs species studied at intervals of 15 years helps to increase their life expectancy by 34–36 years and reach the age of 52–54 years.*

## ***Shrubs, rejuvenation, increased life expectancy***

Bushes play an important role in a forestry and decorative gardening. In the forest stand they form an undergrowth, which protects the surface of soil from swarding, water erosion, enriches soil of the plant fall, serves as refuge for wild animals, in particular by the place of nesting many feathery [8]. On territories of green belts bushes enter in the complement of the green planting as biogroups, solitaires, green walls, as inalienable part of the unique landscape system [1, 3, 4, 8, 9].

At favorable soil-climatic and other terms under the forest cover age of shrub species averages 10–15 years [2, 8], and during the lead through of rejuvenation – 30 years [7, 9]. On Bukovina [6] in the palisades of living longer of forest bush species – 10 years and anymore (to 60 years). Important value the problem of rejuvenation of the green planting has in cities [5].

**Purpose of researches** – valuation of efficiency of trimming of above-ground part of bushes for the increase of their age, silvicultural and decorative properties in the conditions of city and in the forest stands.

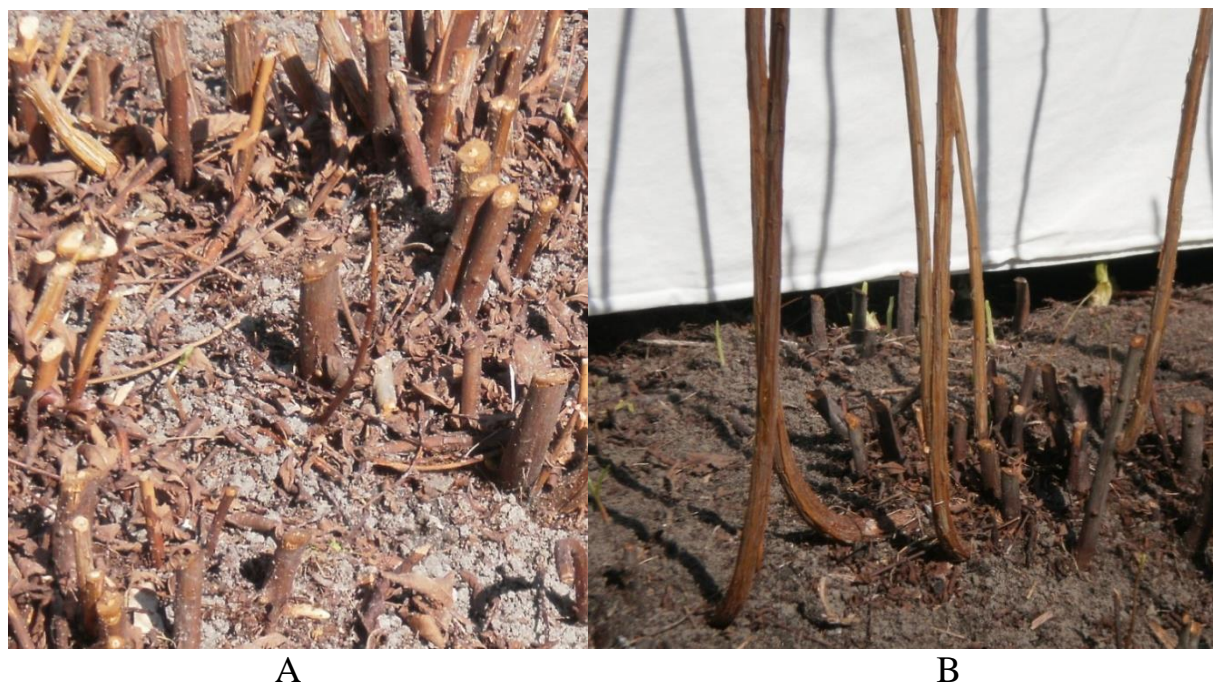
**Materials and method of researches.** Researches were conducted during 1976–2013 on territory of Bila Tserkva city of the Kyivan area (a type of forest soil

terms is a fresh dubrava) and in a quarter 28 Tomylivka forest district of «Bila Tserkva Forestry» in forest plantation. This stand created in 1961–1962 years by placing of plant beds is 2,0x1,0 m, with the duty of rows of main species (*Quercus robur*), concomitant species (*Acer platanoides*) and bushes. Density of stand – 1,0, type of л forest terms – fresh dubrava, soil – sandy loam fresh. Composition of stand – 8Oak2Maple, with oak in the first circle, maple – in the second circle and undergrowth – in third circle. The last consisted of 5 species of bushes (*Spiraea media*, *Lonicera tatarica*, *Ligustrum vulgare*, *Cornus sanguinea* and *Cornus alba*). In the city terms the six species of bush (*Spiraea media*, *Spiraea vanhouttei*, *Spiraea salicifolia*, *Lonicera tatarica*, *Lonicera xilosteuum*, *Ligustrum vulgare*, *Cornus sanguinea*) was investigated.

The first rejuvenation of bushes was conducted in age 16–17. In this period overwhelming part of bushes was hyposthenic, low-spirited, from partly half-dry or top-dry twigs. A trimming was repeated by periodicity in 15 years. For control part of bushes was abandoned in the natural state. In the forest cultures of Tomylivka forest district the rejuvenation of bushes was executed at the beginning of spring. A above-ground part of bushes cutting away on height of 2–5 cm from the surface of soil (rice. 1, a).

In the green belt of city, except for the above-mentioned, also another way applied. At him all of old twigs deleted, the thin (to 4 mm) «seated on a stump», and more thick young twigs cut to the height on which they had a diameter of 4mm and anymore (rice. 1, b).

In autumn, upon termination of growth of bushes, research of their state and growth conducted. The height of escapes was set a measuring rail within 1,0 cm, and diameter (above the point of cutting away) – by a trammelhead within 1,0 mm. For researches took for 30 middle bushes.



**Rice. 1. Methods of rejuvenation of bushes:**  
A – first, B – second

After the first rejuvenation of bushes in a public garden near the Bilocerkiivskyi Agrarian University, it appeared, that in the city conditions the first variant is useless through trampling and breaking out of young twigs and from him here was to renounce. Repeated rejuvenation of bushes in city are conducted in 1993 and 2008, and in Tomylivka forest district – one year before.

**Results of researches.** The results of the conducted researches are resulted in table 1.

**1. Influence of the conducted rejuvenations on stored of bushes of some types of bushes on territory of Bila Tserkva city**

Age of bushes and their number after years											
in 1976		in 1978		in 1981		in 1992		in 2007		in 2013	
Age, year	Number	Rejuvenation		Age	Num-ber	Rejuvenation		Rejuvenation		Age years	Num-ber
		Age years	Num-ber			Age years	Num-ber	Age years	Num-ber		
<i>Spiraea media</i>											
14	174	16	169	19	167	30	167	45	167	51	167
14	86	16	-	19	-	-	-	-	-	-	-
<i>Spiraea vanhouttei</i>											
15	158	17	155	20	153	31	153	46	153	52	152
15	94	17	-	20	-	-	-	-	-	-	-
<i>Spiraea salicifolia</i>											
15	193	17	191	20	190	31	189	46	189	52	190

15	85	17	-	20	-	-	-	-	-	-	-
<i>Lonicera xilosteuum</i>											
14	127	16	124	19	124	30	124	45	123	51	123
14	66	16	-	19	-	-	-	-	-	-	-
<i>Lonicera tatarica</i>											
15	119	17	117	20	116	31	116	46	116	52	115
15	58	17	-	20	-	-	-	-	-	-	-
<i>Ligustrum vulgare</i>											
14	180	16	176	19	176	30	175	45	174	51	174
14	73	16	-	19	-	-	-	-	-	-	-
<i>Cornus sanguine</i>											
14	176	16	175	19	173	30	173	45	172	51	172
14	69	16	-	19	-	-	-	-	-	-	-

Note: first line – with a rejuvenation, second – without a rejuvenation

As evidently from the resulted information, during the the first rejuvenation in 1978 (age of plants – 16–17 years), in the every species from 119 to 193 bushes is probed, and on controls – 58–94 number. After two years the number of twigs did not change on the cut away bushes, or diminished on 1–2 bushes. On the control to 1980 half dead only for 3–5 individuals are remained which. dried up fully to 1981.

The second rejuvenation of bushes was conducted in 1993 (age – 31–32 years), and third – in 2008 (age 46–47 years). Will mark that for period from 1978 to 2013 the amount of plants went down insignificantly – mainly on 1–3 bushes. (1–2 %).

Consequently, at three periodic rejuvenations of seven species of bushes in the conditions of city from 1978 to 2013 became possible to increase duration of their life on 34–35 years and lead to him to 52–53.

In Tomylivka forest district on the experimental area of forest cultures the first rejuvenation of 16–17-year-old bushes was conducted in 1977 (tablas. 2).

## 2. Influence of rejuvenations on stored of bushes of some species of bushes under the tent of forest plantation

Age of bushes and their number after years											
in 1975		in 1977		in 1980		in 1992		in 2007		in 2013	
Age, years	Num-ber	Rejuvenation		Age, years	Num-ber	Rejuvenation		Rejuvenation		Age years	Num-ber
		Age years	Num-ber			Age years	Num-ber	Age years	Num-ber		
<i>Spiraea media</i>											
14	116	16	114	19	112	31	112	46	112	52	112

14	67	16	63	19	-	-	-	-	-	-	-
<i>Lonicera tatarica</i>											
15	153	17	150	20	149	32	148	47	148	53	148
15	74	17	71	20	-	-	-	-	-	-	-
<i>Ligustrum vulgare</i>											
14	132	16	131	19	130	31	129	46	128	52	128
14	61	16	58	19	-	-	-	-	-	-	-
<i>Cornus sanguine</i>											
15	129	17	127	20	127	32	126	47	126	53	126
15	66	17	64	20	-	-	-	-	-	-	-
<i>Cornus alba</i>											
15	147	17	145	20	144	32	144	47	143	53	143
15	78	17	76	20	-	-	-	-	-	-	-

Note: first line – with a rejuvenation, second – without a rejuvenation

Among five species of shrubs to beginning of experiment from 116 (*Spiraea media*) to 153 bushes (*Lonicera tatarica*), and on control – from 58 (*Ligustrum vulgare*) to 76 (*Ligustrum vulgare*) here counted. Before the first rejuvenation in 1977 the stored of experimental plants was 97–98 %, and on control – 95–96 %. At that time on control on 1979 remained for 3–5 bushes of every species, and in 1980 they is dry.

The second rejuvenation of bushes was conduced in 1992, and third – in 2007 that with periodicity 15 years. Stored in 2013 made them 98–99 % in relation to 1977, that in quantitative expression equaled diminishing on 1–3 bushes.

On the whole here for period 1977–2013, due to three periodic rejuvenations, age of bushes lasted on 35–36 years and general period of life – to 53–54.

Research of dynamics of middle number of twigs in the bushes, utilized in an experiment, specifies on substantial growth of this index with age (tablas. 3).

### 3. A dynamics of middle number of twigs of the probed species on a 1 bush

A middle amount of escapes is after years								
in 1978			in 1992			in 2013		
M±m, шт.	η	t	M±m, шт.	η	t	M±m, шт.	η	t

#### Bila Tserkva city

##### *Spiraea media*

4,6±0,21	1,4	1,5	11,0±0,20	1,0	1,2	14,7±0,24	1,3	-
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##### *Spiraea vanhouttei*

4,8±0,27	1,3		10,7±0,26	1,4		14,3±0,25	1,2	1,6
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			<i>Spiraea salicifolia</i>					
4,4±0,24	1,0		11,1±0,22	2,3		14,4±0,29	0,8	1,8
			<i>Lonicera xilosteuum</i>					
2,4±0,16	1,2		9,1±0,19	0,8		10,3±0,18	0,7	7,9
			<i>Lonicera tatarica</i>					
2,0±0,16	1,6		8,2±0,31	1,8		10,0±0,19	2,5	8,2
			<i>Ligustrum vulgare</i>					
2,1±0,19	1,8		9,0±0,18	1,9		10,2±0,17	1,5	8,5
			<i>Cornus sanguine</i>					
2,3±0,16	1,7		8,7±0,21	1,8		10,6±0,22	1,9	7,4
			<b>Tomylivka forest district</b>					
in 1977			in 1991			in 2013		
			<i>Spiraea media</i>					
3,2±0,17	1,2	3,9	9,8±0,18	1,1	3,7	11,3±0,21	1,2	-
			<i>Lonicera tatarica</i>					
2,0±0,16	1,6		8,2±0,31	1,8		10,0±0,19	2,5	4,3
			<i>Ligustrum vulgare</i>					
1,9±0,22	1,8		7,6±0,21	2,3		9,0±0,17	1,8	6,7
			<i>Cornus sanguine</i>					
2,1±0,23	2,5		7,5±0,16	1,3		9,8±0,23	2,8	3,9
			<i>Cornus alba</i>					
2,0±0,19	2,3		7,7±0,22	2,6		9,6±0,26	2,4	4,5

As see, during the first account on territory of city number of twigs in *Spiraea vanhouttei* and *Spiraea salicifolia* was within the limits of 4–5 on one bush, that did not differ from control. At a *Lonicera xilosteuum* and *Lonicera tatarica*, *Ligustrum vulgare* and *Cornus sanguine* this index for certain less than from *Spiraea media* on 2,3–2,5. In the forest cultures of Tomylivka forest district at four species (*Lonicera tatarica*, *Ligustrum vulgare*, *Cornus sanguine* and *Cornus alba*) he yields to control also for certain ( $t>3$ ) – on 1,1–1,3, although something more low from the bushes in city (1,9–3,2).

At the second account, as materials of tablas 3 testify, the greater number of twigs was observed in the green belt of city (through the best illumination and richest soil) and were 8,7–11,0 against 7,5–9,8 in bushes of forest cultures. Characteristically, that and here, on Bila Tserkva city among three species of *Cornus* the substantial difference did not find ( $t<3$ ). At other species the less values of this index discovered for certain comparatively with control ( $t>3$ ). In forest

plantation after the number of twigs all of four species yielded of *Spiraea media* substantially ( $t > 3$ ).

A situation in relation to the third account was analogical the second term of inspection. Only twigs here anymore – from 9,0–11,3 in a forest district and for 10,2–14,7 on the areas of city are counted.

It is important to mark that in the green belt of city it is impossible it was to define the height of twigs, because, beginning from the second year after a rejuvenation, all of bushes cut at identical level. And in the forest cultures it measured in those terms, that and amount of twigs (tablas.4).

On the first account such height hesitated within the limits of 45–55 cm, thus it was not found out a substantial difference between control and *Lonicera xilosteum*, *Ligustrum vulgare* and two species of *Cornus* ( $t < 3$ ). During the second supervision the absolute values of this index considerably anymore – 127–157 cm. However substantial differences between *Spiraea media* and it is not confirmed other species of bushes statistically ( $t < 3$ ), after the exception of *Lonicera tatarica* ( $t = 3,8$ ). In 2013 the height of twigs arrived at 93–113 cm, wherever reliable advantages of control were not above four species of bushes ( $t < 3$ ).

#### 4. Medium-height of twigs of bushes (Tomylivka forest district)

Species	Height of twigs								
	in 1977			in 1991			in 2013		
	M±m, cm	η	t	M±m, cm	η	t	M±m, cm	η	t
<i>Spiraea media</i>	53,5±5,9	1,8	1,6	134,9±7,6	1,7	3,8	112,8±7,3	2,6	-
<i>Lonicera tatarica</i>	48,8±6,2	2,1		156,5±7,4	1,4		115,1±6,9	2,8	0,9
<i>Ligustrum vulgare</i>	44,7±5,1	1,5		142,4±6,9			93,0±7,7	2,1	1,6
<i>Cornus sanguine</i>	48,9±6,3	1,3		136,8±6,1	2,4		105,2±7,9	2,4	1,4
<i>Cornus alba</i>	55,4±6,7	1,1		127,3±7,2	1,9		106,5±6,5	2,3	1,2

Analysis of diameter indexes of twigs in the bushes of the probed kinds shows that in the conditions of city he grows with age, and under the tent of forest plantation hi appeared most before the first rejuvenation (tablas. 5).

## 5. A middle diameter of twigs is near the surface of soil in the bushes of studied species

Seredniydiametr of escapes after years								
in 1978			in 1992			in 2013		
M±m, mm	η	t	M±m, mm	η	t	M±m, mm	η	t
Bila Tserkva city								
Spiraea media								
6,4±0,4	1,3	1,7	13,2±0,3	1,6	1,9	14,3±0,5	1,4	-
Spiraea vanhouttei								
6,1±0,3	1,2		13,5±0,2	1,3		14,6±0,4	0,8	1,8
Spiraea salicifolia								
5,8±0,2	0,8		13,8±0,5	2,0		14,8±0,3	1,7	1,3
Lonicera xilosteum								
4,2±0,3	1,6		9,7±0,4	1,2		11,1±0,4	1,5	4,5
Lonicera tatarica								
4,0±0,2	2,0		9,9±0,5	1,7		11,5±0,2	2,2	3,9
Ligustrum vulgare								
4,3±0,3	1,8		9,5±0,3	1,9		11,7±0,3	1,2	3,3
Cornus sanguine								
4,1±0,5	1,9		10,3±0,2	1,2		11,0±0,4	0,8	5,4
Tomylivka forest district								
in 1977			in 1991			in 2013		
Spiraea media								
4,1±0,3	1,7	2,4	11,9±0,4	2,2	2,0	10,1±0,3	1,2	-
Lonicera tatarica								
4,6±0,4	2,0		12,6±0,4	0,9		10,5±0,4	1,5	1,7
Ligustrum vulgare								
4,8±0,5	2,2		12,3±0,2	1,8		11,0±0,5	1,6	2,0
Cornus sanguine								
4,7±0,4	1,5		12,6±0,5	1,6		10,4±0,4	1,8	1,5
Cornus alba								
3.9±0.2	0.8		12.4±0.4	2.3		10.9±0.5	1.9	1.8

During the first account on lot lands of city he made 4,0–6,5 mm. Here at two species of *Spiraea* a substantial difference absents in relation to control, and at two species of *Lonicera*, *Ligustrum vulgare* and *Cornus* it for certain more low ( $t < 3$ ) – on 2,1–2,4 mm. In Tomylivka forest district the thickness of twigs less than (3,9–4,8 mm) and substantial differences between the species of bushes and *Spiraea media* is absent ( $t < 3$ ).

At the second inspection a situation was identical to the first account, that in the green belt of city afore-named four species of bushes after a diameter



exceeded control for certain – on 2,9–3,5 mm ( $t > 3$ ), and *Spiraea* and other species of bushes in Tomylivka forest district identical diameters had practically ( $t < 3$ ).

The third account witnessed that thickness of twigs of *Spiraea* in Bila Tserkva identical ( $t < 3$ ), and in *Lonicera xilosteuum*, *Lonicera tatarica*, *Ligustrum vulgare* and *Cornus* species it for certain more small. In a forest this index was characterized insignificant amplitude on all bushes (0,3–0,9 mm), what unimportant. In absolute expression here the diameter of twigs anymore on territory of city, than under the tent of the forest on 0,9–4,7 mm

Comparing renewal and growth of twigs at bushes in the green belt of city and in the forest for period 1977–2013, will notice that they took a place at sufficient level. Here bushes had certain advantage on territory of Bila Tserkva, where more intensive illumination and more richest soil. Among them on quantitative and high-quality indexes the species of *Spiraea* genus is often selected in the best side.

Thus, the triple rejuvenation of eight species of bushes on lot lands of city and in forest is instrumental in the increase of duration of their life on 34–36 years and leading to of him to 52–54.

### **Conclusions**

1. In the forest plantation of Tomylivka forest district positively the first method of rejuvenation of bushes are established. Which it was cut away «on a stump» all of old and young twigs.

2. On territory of Bila Tserkva city the second method of rejuvenation of bushes, at which deleted all of old twigs and thin young twigs, appeared effective, abandoning more thick young escapes and cutting out overhead part on them (to thickness 4 mm).

3. Renewals new and growth of leave young (offcut in spring) twigs took a place already during the first vegetation period, and their parameters were increased later, a rejuvenation had passed successfully.

4. After a rejuvenation the higher productivity, as a rule, had bushes on territory of city, than in the forest plantation– through more richest soil and the best illumination.

5. In the green belt of city after periodic rejuvenations a bushes kept the decorativeness.

6. Periodic (in 15 years) triple rejuvenation of 8 types of bushes on Bila Tserkva region were instrumental in the increase of their age on 34–36 years and growth of life-span to 52–54.

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