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POTENTIAL FROST-RESISTANCE OF *LONICERA* L. SPECIES AND ANALYSES OF FACTORS WHICH LIMITS THEIR WINTER HARDINESS

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Introduction

Among all the environmental factors that influence on growth, development and ornamental features stability of introduced plants one of the important factors is the climate of the particular territory and weather conditions of exact place of growth and season. It has been known that atmosphere processes in the Crimea are variable [1, 12] and unforable agrometeorological situations which have a conclusive affect for conservation of ornamental qualities of plant introduced from subtropical and tropical regions are often. All these determine necessaty of weather conditions and level of plants` crioresistance carefull analyses for finding both optimal and stress conditions that influence realization of adaptive potential in deciduous and evergreen ornamental introduced plants including species from the genus *Lonicera* L. [2, 5]. Actuality of this question is also connected with the need for Crimean park plantings of assortiment of the plants resistant to winter stress conditions combine ornamental features of flowering and fruiting in those periods of vegetative season when the range of different plants` flowering is limited [3, 5]. Genus *Lonicera* L. includes more than 200 species most of which are decorative [2, 3, 13] and widely used in ornamental plantings and park gardening. Some species are used in medicine and have valuable food qualities [9, 13]. In nature *Lonicera* species are more often in tropical and subtropical regions and only some species grow in the temperate zone [9] and preservation of these plants` viability is needed of all their adaptive mechanisms mobilization.

So we studied potential frost-resistance of some Lonicera species for determination of intraspecies special features of anatomy-morphologycal and physiology-biologycal adaptive mechanisms in their shoots and buds due to the introduction into climatic conditions of the Southern coast of the Crimea.

Material and methods

As the investigation objects we have chosen 9 species and 2 garden varieties from the genus *Lonicera* that grow in the Arboretum of Nikitsky Botanical Gardens: *Lonicera tatarica* L., *L. maackii* (Rupr.) Maxim. (deciduous erect species), *L. pileata* Oliv., *L. pileata* 'Variegata', *L. nitida* Wils., *L. nitida* 'Elegant' (evergreen strait and prostrate), *L. caprifolium* L., *L. etrusca* Santi., *L. henryi* Hemsl., *L. japonica* Thunb. (climbing plants) и *L. fragrantissima* Lindl. et Paxt. (chimochlorous strait plant). Investigations have been carried out in 2012 - 2014. Frost-resistance evaluation was made by method of cutted annual shoots direct freezing under the various temperatures in the climate-control chamber «Gruland» (temperature decrease gradient 2°C/hour) in different wintering periods [11]. This method was used in our modification for adornment shrubs that means optimization of freezing regime and hardening for introduced species. Damages estimation was preceded with slowly melting of the investigated objects (the shoots were kept under the temperature -2…0°C for a day and the same time under 0… +2°C).

Depth and duration of buds biological repose have been obtained in the laboratory conditions with the method by Elmanova, Ahmatova [4]. Stages of intrabud development have been determined by Kouperman [6]. Diagnostics of frost-resistance was also made due to anatomy-morphological signs of the wood ripening and indexes of carbohydrate cycle. For wood ripening rate determination we used histochemical analyses of annual shoots` tissues with Meule permanganate reaction [8].

Results and discussion

Due to our data in the conditions of the Southern coast of the Crimea frost-resistance of various tissues in *Lonicera* plants is not the same. Lower temperatures, especially after the periods of warming in February damage not only buds but also destructive for vegetative parts of plants. The most sensitive is the apical parts of annual shoots. Shoots` resistance correlates with seasonal changes of the air temperatures so harmful effect of the low temperatures becomes stronger in late winter.

Results of direct freezing in the climate-control chamber under the temperature -12°C in autumn demonstrated some damages in the cells of the vascular system, perimedular zone, sometimes in the pith bands, in February under -20°C damages of cortical parenchyma tissues, not more than 30% of a transvercive stain surface, were noticed. Less damages were observed in the shoots of erect decidouos and evergreen *Lonicera* species compared with climbing ones that could be, possibly, explaned with the rate of wood ripening in shoots. Some authers [11, 14, 15] supposed that winterhardiness in plants and their success in low-temperature stress overcoming depend not only of the winter period but also from their preparation in summer and autumn. One of those processes is shoot lignification that is preceded with wood formation and ripening. Anatomy investigations of annual shoots` tissues were carried out and let to define some features characteristic for erect and climbing *Lonicera* species. Thus, primary cortex consists of epidermis, subepidermal lamellar collenchyme and cortical parenchyma. Epidermis is of one layer, collenchyme depending of the weather conditions and vegetative period has different rate of development and it could consists of 2-3 (*L. tatarica* and *L. maackii* in 2012) up to 4-6 (*L. tatarica* in 2013) cell layers. Cortical parenchyma is geterogenous. It presents as two rows of round or isodiametric cells adjacent to the collenchym. Just near the floem parenchyma cells are some elongated. It`s important to notice that in erect *Lonicera* species round cells of cortical parenchyma form the entire ring of pith rays along the shoot cylinder and in climbing species they are in groups which are connected with the elongated parenchymatous cells. For all studied species presence of calcium oxalate crusts in the bark epidermis cells is typical. Cell walls of the primary cortex in erect *Lonicera* species become wooden and together with bast and sclerenchym fibers could get the functions of mechanical tissue.

L.I. Lotova and A.K. Timohina [7] reported that in *Lonicera* plants secondary ground tissue – periderm is formed deeply in the primary cortex or in the external layers of the centre cylinder. Our researches demonstrate that in some *Lonicera* species in the conditions of the SCC periderm forms deeply in the primary cortex (noticeable in *L. tatarica*, *L. maackii*, *L. pileata* and *L. fragrantissima*) but the rate of its formation differs. In some species felogen just near floem as an etire ring along the whole cylinder (*L. tatarica* and *L. maackii*) but in evergreen and wintergreen erect *Lonicera* this tissue was formed in the basal and middle parts of the shoot from 3-4 floema layers and 1-2 layers of felloderm. In climbing *Lonicera* species, in spite of their decidouos or evergreen state, formation of periderm was poor and in *L. caprifolium* and *L. etrusca* it consists of 1-2 cell layers.

Our investigations demonstrates that in all studied erect *Lonicera* species cells of the secondary cortex are lignificated and in climbing ones the rate of annual shoots` lignifications is significantly lower that could be connected with the growth processes which last through all the period of vegetation. In strait species cambium functions for secondary floem formation (thick bast and sclerenchym fibers) was noticed up to the stage of deep repose (its typical only for *L. tatarica* and *L. maackii*). In *L. henriy* and *L. japonica* wood is poor differentiated, sclerenchym rings and floem fibers are formed only in the basal parts of annual shoots. In these species stele takes the greates part of the shoot structure.

For successful wintering of trees and shrubs seasonable and full ripening of shoots is very important [7, 10]. Microscope analyses have shown that in annual shoots of *L. tatarica*, *L. maackii*, *L. fragrantissima*, *L. pileata* and *L. nitida* cell walls are lignifyed in the cells of xylem, pith, sclerenchym fibers of floem, isodiametric cells of the bark parenchyma and very seldom in the cells of collenchyme.

On the base of hystochemical analys results we have determined 4 species with high rate of lignifications – these are deciduous and evergreen shrubs: *L. tatarica*, *L. maackii*, *L. fragrantissima* and *L. nitida*. Middle rate of lygnification, when under Meule reaction border between cambium and wood was noticed in 50% of shoots, is characteristic for 3 species - *L. caprifolium*, *L. pileata*, *L. henryi* and two garden forms of the evergreen *Lonicera*. Climbing species *L. etrusca* and *L. japonica* have the lowest rate of lignification.

It is offered to use oligosaccharides` accumulation in the bark of annual shoots as a diagnostic sign [8, 14]. Our researches of seasonal changes in starch amount in the plant tissues have demonstrated that for most of *Lonicera* species two maximums were noticed – in autumn and winter. Storage tissues are xylem rays and perimedulate zone. In floem this polysaccharide is accumulated in 3-4 cell rows at the primary cortex.

In autumn (September – October) starch is more often presented in cortical parenchyma and pith rays and primary hydrolyzed in phloem. In the cold period November – January starch grains were noticed in pith rays, pith and perimedulate zone in *L. fragrantissima*, *L. nitida*, *L. pileata* and *L. caprifolium* only. In the periods of thaws a little amount of starch was noticed in pith rays (February – March). Changes in starch accumulation and resynthesis in *L. maackii* in winter conditions 2012-2013 are presented in fig. 1.

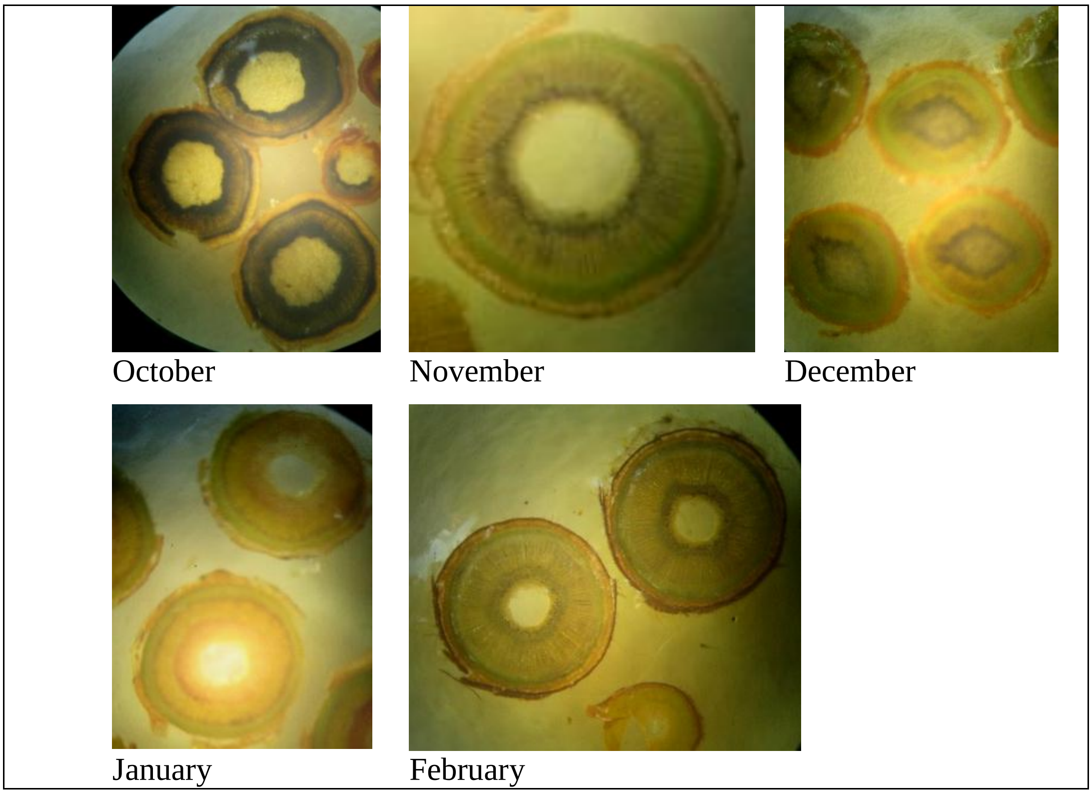

Fig. 1 Starch in *L. maackii* shoot in the autumn – winter period 2012 – 2013.

We have found out that intensive starch hydrolysis started in November when the average day temperature was +11.5…+10.3°C. Probably, in this way carbohydrates in monomeric state could fuction as cryoprotectors for tissues of wintering organs and so to increase their potential frost-resistance.

Deep repose is characteristic only for deciduous erect *Lonicera* shrubs - *L. tatarica* and *L. maackii*. Its initiation suited to the phenological stage of defoliation (second decade of November, 2012 and the third decade of November, 2013). Investigations have demonstrated that deep repose for these species is 68-72 days and it`s followed with forced rest up to the beginning of bud swelling. Duration of forced rest was 20-23 days and strongly depends from the air temperature regime.

In November, 2012 investigations of biological resting depth for *Lonicera* buds have been carried out. Thus the lowest concentration of gibberellic acid (GA) for breaking resting in *L. tatarica* and *L. maackii* was 200 mg/l and after 10-14 days of experiment terminal and low serial buds were fully open proportionally along the shoot.

For climbing and evergreen *Lonicera* species deep resting is not typical. From late October to early November buds of these species are in the forced rest and after they have been placed in favourable growth conditions in most buds active formation processes were noticed. The same phenomenon but more slowly was observed in nature conditions especially during the thaws. For bud swelling and opening keeping shoots in water with GA (50 mg/l) for 5 days is enough. However, in climbing *Lonicera* species all buds were swelling and the first open were buds on the orthogonal side of shoot at its base. In the evergreen species *L. nitida* and *L. pileata* and their garden forms *L. pileata* 'Variegata' and *L. nitida* 'Elegant' terminal buds open first and then the buds on the apical part of the shoot.

The earliest beginning of the resting was noticed for winterflowering species *L. fragrantissima* (late August – September). Bud formation in this species occuers in April – May and it is followed with rapid differentiation of tissues and initial flowers` formation. To September meiosis and microspores formation are finished (it should be noticed that this species has prolonged bud development: in the same plant in September – November buds in various development stages – from the beginning of flower organs formation to sporogenious tissue in microsporangium). It has long blossom in winter (initial blossom is in the second decade of December, full blossom in January – February, the end of blossom – the second decade of April).

Regulated freezing under various temperature regimes gave us possibility to determing temperature parameters for appearance of various types of damages and also to find out the lethal temperatures for each species. It has been found out that for *L. nitida* and *L. pileata* lethal temperature was -12.5°C and for the garden form *L. nitida* 'Elegant' it was -14.0°C. Climbing species and evergreen *L. fragrantissima* demonstrated middle rate of frost-resistance, the lethal temperature for them was -18.0°C. The most frost-resistant species are *L. maackii* and *L. tatarica* (the lethal temperatures for them were -20.0°C and -24.0°C correspondently). In autumn before the first cold in *L. tatarica* and *L. maackii* buds with already formed initial flowers at the stage of flower organs formation had no significant damages under the temperature 10.0°C (frost-resistance of buds was 82.8% – 88.5%) (fig. 2). At this stage tissues at the base of the buds were damaged, probably, because of their high water content. Further (in November) when flower organogenesis processes have been finished and influence of hardening temperatures has been initiated in nature conditions these species demonstrated high frost-resistance (64.1% – 88.1%) under the temperatures -12.0°C…-14.0°C. As the period of deep rest began, frost-resistance increased and its maximum was in December. At that time buds of *L. tatarica* and *L. maackii* stayed alive under the temperatures -18.0°C – -20.0°C; the most often damages were noticed in generative sphere tissues, apex and leaf primordium (not more than 20 – 30% of the bud stain surface).

During the period of forced rest (late January – February) when it occured intensive growth of flower elements, sporogenous tissue formation, meiosis and microspores development cryoresistence significally decreased. Bud death under controlled freezing with the temperature -20.0°C was 52.8% – 56.9% at this developmentale stage. According to our observations in February – March phenologycal phase of bud swelling and the first leaves opening began. At this stage under the temperature -12.0°C influenced for 48 hours 63.2% – 66.2% of buds were alive and the most often damages were noticed for buds of the basal part (for *Lonicera* species prolonged development is typical and buds of the basal part are more progressive in their growth and development) and young open leaves. At the same time damages of generative sphere, that is usually more sensitive to the frosts, haven`t been noticed. It is shown in fig. 2 that *L. tatarica* demonstrated higher rate of frost-resistance at all stages of the intrabud development compared with *L. maackii*.

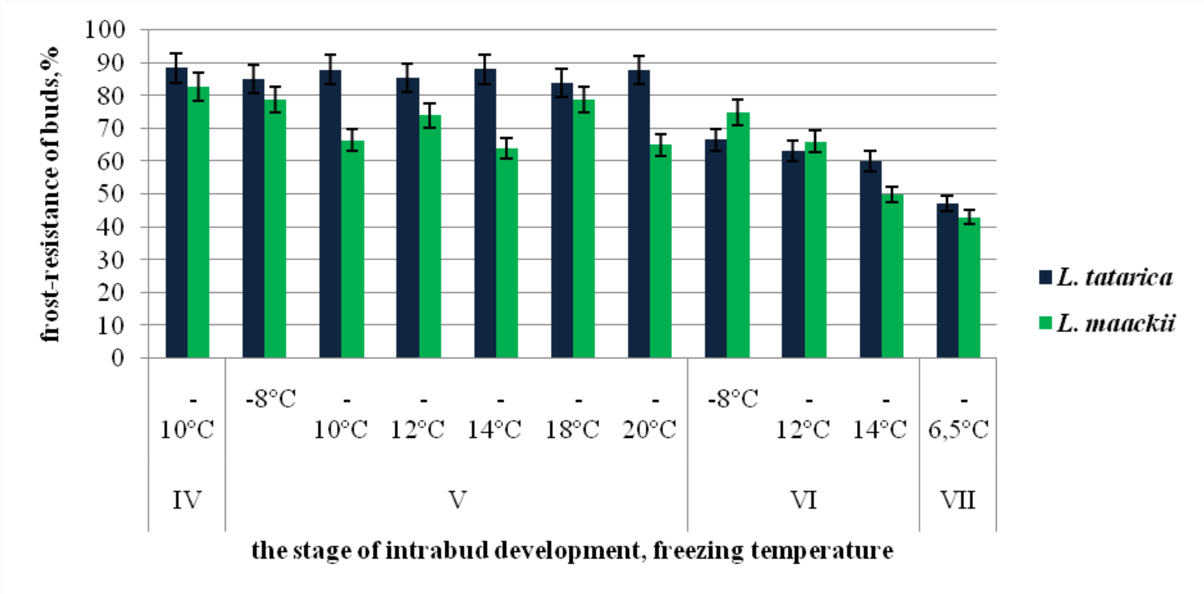

Fig. 2 Changes in bud frost-resistance in erect deciduous *Lonicera* species in the dependence of their development stage: IV – formation of initial flowers, beginning of flower organs formation; V – gradual formation of flower organs, sporogenous tissue formation in microsporangium; VI – intensive growth of flower elements, meiosis and microspores formation in microsporangium; VII – pollen.

Among the evergreen erect and spreading species *L. nitida*, *L. pileata*, their garden forms – *L. nitida* 'Elegant' and – *L. pileata* 'Variegata' were studied. In these species frost-resistance decreased along the row pith – cortical parenhyme of shoots – buds – leaves. Under the freezing with the temperature -7,0°C… -10,0°C typical damages of the leaf tissues were necrotic spots, that appeared mostly on the low (abaxial) side of the leaf blade in the among veins space. Under the temperature -12,5°C…-14,0°C for 12 hours all leaves died in *L. pileata* 'Variegata' and in *L. pileata* base of the leaf blades were damaged, necrosis were more than 40% of the leaf surface. In *L. nitida* and *L. nitida* 'Elegant' under this temperature only point necrosis of among rip parenchyma and rips was noticed.

The most sensitive to the low temperature stress during the cold period were leaves in *L. pileata* 'Variegata' that partly lost their decorative features: necrotic spots were on the chlorophyll free parts of the leaf. In other evergreen species in nature wintering conditions leaf damages were not more than 10% (point necrosis) without loose of turgescence and decorative features and ability to renew after frost influence. In late December – January leaf frost-resistance is higher than in autumn that is probably connected with osmotic water part increasing. Presence of the snow cover on shrubs during some days led to the appearance of chlorotic spots but in some period of times leaves were able to the reparation.

Initial damage temperature for the buds of the evergreen *Lonicera* species was -8.5°C. To the begining of the cold period generative shoot and flower organs have been already formed in buds and they could endure the frost -10.0°C but under the temperature -12.0°C only 20% of buds were undamaged and for *L. pileata* 'Variegata' this temperature at the stage of flower organogenesis was critical. Typical damages were – tissue necrosis at the base of terminal buds and generative structures. In early January intencive growth of flower parts and microspores formation occurred. In this period increasing of bud frost-resistance in the experiment conditions was noticed – under the temperature 12.0°C frost-resistance was 29.7 – 44.3%. *L. nitida* 'Elegant' was resistant to the temperature -13,5°C its buds` frost-resistance was 48.1%. Lethal temperature for above described evergreen erect and spread *Lonicera* was -14.0°C.

During the whole winter period evergreen *Lonicera* species were at the forced rest but during the long thaws their rest was broken and growth processes began. In 2012-2014 phenophase of bud swelling and primary leaves opening was noticed in January – February (due to warm winter and long period without frosts), in the generative sphere mature pollen grains have been formed and young shoots started their growth. At that time buds of the evergreen *Lonicera* species died under the temperature -6.5°C: shoot pith, vascular system and base of the buds, leaf primordiums and flowers were damaged. Among the studied species the most resistant to the low temperature stress were garden forms of *L. nitida* 'Elegant' and *L. pileata* (tabl. 1).

Table 1

Frost-resistance of buds in the evergreen *Lonicera* species during the wintering period

Phase of intrabud development	Flower organs initiation: sporogenous tissue formation in the anthers		Flower elements intensive growth, meiosis and microspores` formation in the anthers		Mature pollen grains
Species, forms / Temperature of experimental freezing	-10°C	-12°C	-10°C	-12°C	-6.5°C
L. nitida	83.6±5.3	14.4±1.2	68.4±4.4	29.7±2.3	31.5±2.6
L. nitida 'Elegant'	84.7±4.9	20.8±0.8	81.8±3.6	44,3±3.1	15.6±1.2
L. pileata '	71.0±3.1	15.3±1.9	72.2±4.1	39,4±2.0	10.7±0.9
L. pileata 'Variegata'	86.5±9.4	0,0	93.6±5.1	28,4±1.3	12.6±1.5

Probability of the year minimums ≤ −7°C in the SCC is 69% these frosts have been noticed almost in 7 years of 10 [12]. Thus in our conditions *L. pileata* 'Variegata' leaves are always damaged partly. Frosts of -12°C are seldom, their probability 26% and under this temperature wintering aboveground organs in all studied species could be damaged. It has been found that absolute air temperature minimum -14,6°C is lethal for all studied species in the introduction conditions but as it`s known from the literature sourses [3, 13] for these species renewal from the undamaged root and axial stems bud is possible.

Particular attention should be payed to the wintergreen and winterflowering species *L. fragrantissima*. As other *Lonicera* species this one also has prolonged intrabud development. It has fully formed flower couples in most of buds in September. Phase of rest is not long. In winter conditions 2011-2012 (minimal temperature was up to -11.9°C, the air temperatures -9,4…11,9°C noticed for more than 12 hours and temperature decrease was accompanied with stomy wind 21-24 m/s) *L. fragrantissima* fell all its leaves and only in the microclimate conditions of the Low Park in NBG Arboretum its plants kept about 40% of foliage. Winter periods in 2012-2013 and 2013-2014 were warmer and *L. fragrantissima* was foliaceous. In our experiments we have determined the low temperatures influence on leaf decorative appearance in this species: under -12.0°C leaf damages weren`t noticed, temperature -14.0°C could give the damages of leaf parenchyma along the rips on abaxial side of the leaf blade; under the temperature -20.0°C for 12 hours more than 70% of the leaf surface along the edges were damaged. Young leaves appear after mass blossom and they are very sensitive to frosts.

Bud frost-resistance in *L. fragrantissima* under the temperature -8.0°C, in October, was 98.2%. In late November – December in the most of buds intencive growth of flower elements and microspores formation were noticed. Under the temperature -14.0°C bud frost-resistance was 80.6% and under the temperature -20.0°C only 30.9% of buds was alive. At the period of pollen grains formation and flowering cryoresistance decreased significantly. The temperature -15.0°C is lethal for *L. fragrantissima* buds at this developmental stage. Typical damages were necrosis of vascular bridge in buds, generative sphere and leaf primordiums. Bark cracking between the neighbor buds also increased. Flower damages in nature conditions were noticed under the temperature -2.5°C. The most damaged structure was style and the most resistant – anthers. It was found out that flowers died under the temperature -3.5°C, flower buds were alive under the temperature -4.0 … -4.5°C and died at -5,0°C.

Climbing *Lonicera* species are strongly decorative [2, 9]. We studied low temperature resistance for two deciduous species - *L. caprifolium* and *L. etrusca*, one wintergreen species - *L. henryi* and perennial one - *L. japonica*. As it has been noticed above they differ from erect *Lonicera* species with their long shoot growth, unripened part of which died under the winter conditions in 2011-2012. In *L. japonica* winter drying and cracking of bark were also noticed. That led to the death of terminal parts in some shoots. In the experiment under the temperature −10.0°C…-12.0°C damages in the cortical parenchyma tissues were noticed.

In *L. japonica* and *L. henryi* under the influence of the low temperature stress leaves lost their turgor and curved (-8.0°C); necrotic sports appeared on their surfaces (-10.0°C) and they died at -14.0°C. In wintering conditions 2011-2012 leaves of these species were damaged and more tha 50% fell down. Chlorosis and necrosis of apical leaf part and among rip parenchyma were often noticed.

Buds in climbing Lonicera species are undifferentiated for a long time – vegetative and further generative. At this stage of the intrsbud development the most frost-resistant were *L. henryi* and *L. etrusca*. Temperature -20.0°C in late December – January was not lethal for *L. caprifolium* (bud frost-resistance 65.7%), *L. etrusca* (36.0%) and *L. henryi* (33.9%) (tabl. 2).

At the time of bud swelling differentiation of the generative shoot main axile, flattening and separation of the shoot apex occurred. At that period low temperature resistance decreased significantly due to high water content in the bud tissues (57.7% – 72.0%, 1g of dry substances is able to keep 1.36 – 2.56 g of water). In the experiment under the temperature -12.0°C for 12 hours the best frost-resistance was noticed for *L. henryi* and *L. etrusca* (73.4% and 65.7% correspondantly); the temperature -18.0°C brought damages for more than 60% of buds; -20,0°C was lethal for all climbing *Lonicera* species at this stage of their intrabud development (tabl. 2). Base and apex of buds were mostly damaged. When primary leaves opened, shoots grew rapidly and initial flowers formed frost-resistance increased. It could be connected with high photosynthetic activity of young leaves that is favourable to plastic substances accumulation, increase of cell sap consentration and ability to hold water (1g of dry substances in open buds is able to hold 2.13 – 3.42 g of water).

Table 2

Changes of potential frost-resistance in climbing *Lonicera* species depending on their intrabud developmental phase

Phase of intrabud development	t	Deciduous		Wintergreen	Perennial
		L. caprifolium	L. etrusca	L. henryi	L. japonica
Vegetative or further generative buds	−8.0°C	90.4±5.8	94.4±2.1	86.7±5.9	89.3±5.0
	−12.0°C	48.9±3.3	87.9±5.0	77.5±4.1	63.9±3.4
	−14.0°C	34.2±2.1	75.3±4.8	71.8±4.4	65.9±4.2
	−20.0°C	15.7±1.4	36.0±2.1	33.9±2.8	0.0
differentiation of the main axile, flattening and isolation of the shoot apex	−10.0°C	89.2±5.8	66.7±4.8	81.3±5.0	68.8±3.9
	−18.0°C	42.3±2.8	43.5±2.7	32.1±2.1	38.7±2.3
	−20.0°C	6.8±0.7	1.8±0.6	3.0±0,5	0.0
Initial flowers formation	−6.5°C	88.2±5.2	96.4±2.1	91.9±4.2	85.6±5.9
	−12.0°C	49.2±3.0	72.4±4.2	90.7±5.8	89.5±5.5
Flower organogenesis	−12.0°C	86.4±5.9	70.6±5.3	*	85.7±4.2

* – hasn`t been determined

As the result of these processes climbing *Lonicera* species had no significant damages under the temperature -12.0°C (frost-resistance 49.2%-90.7%). Ability to resist hypotermal stress was kept during flower organogenesis in *L. caprifolium*, *L. etrusca* and *L. japonica* in late March. The most sensitive was vegetative sphere – apex, leaf primordiums and young leaves. Under the temperature -6.5°C lack of turgor was noticed but after 5 days they fully renewed.

Many authers supposed that death of plants in cold season often occurred not due to unfavourable environmental conditions but because of plants haven`t been resistant enough [14, 15]. To protect themselves from harmfull winter effects plants should change their growth condition, when they have low resistance, to the state of hardiness and to get high cryoresistance. Thus presence unrippened wintering organs (shoots and buds) with high water content in climbing Lonicera species explane their low frost-resistance compaired with erect dicidous species.

Conclusions

Comparison of annual shoots potential frost-resistance in different *Lonicera* species introduced on the Southern Coast of the Crimea with the changes of minimum air temperature in autumn-winter-spring period let us to define the most deserving species for the exhibitions in the parks of SCC and also to estimate probability of their damages with spring frosts. The first group of species with minimum resistance to the low temperatures includes *L. nitida*, *L. pileata* and *L. fragrantissima*. Absolute minimum air temperature for the SCC in winter-spring period is the main danger for their successful wintering and further vegetation. The second group includes climbing species that possibly lack their decorative features under the enfluence of the absolute minimum air temperature in February. *L. etrusca* and *L. japonica* are especially sensitive during this period and *L. caprifolium* – at the beginning of wintering. Annual shoots have poor tissue differentiation: fellogen forms below pericycle (it doesn`t separate a part of floem with hard bast). *L. tatarica* and *L. maackii* are the most frost-rsistant as they have well developed cover tissues in their annual shoots. Fellogen forms from parenchymous cell of secondary floem with some bands of hard bast increasing the cover layer. We have found out that deciduous species are resistant to the temperatures up to -20.0°C at the beginning of winter period and have high cryoresistance till late January. The most endanged stage of their intrabud development is microspores formation after the rest was broken. The results of our investigations give more information about adaptation mechanisms formation in *Lonicera* species and could be used as a base for optimization of exotic plants growth under the influence of exogene stress factors in new climatic conditions.

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Data about anatomy-morphological and physiology-biochemical characteristics of some species Lonicera genus have been presented and some features of their growth under conditions of the South Coast of the Crimea have been discussed. Structure-functional rebuildings in the annual shoots have been suggested as criteria for assessment of Lonicer species winter hardiness, terms of their biological repose and temperatures of initial and lethal damages have been determined. Reliable markers for ornamental Lonicera species winter hardiness prognosis have been suggested on the base of complex physiological analyses of some adaptive reactions in their overground wintering organs under the low temperature stress.

Key words: *Lonicera, potential winter hardiness, biological repose, structure-functional rebuildings, intrabud development, carbohydrate exchange.*