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### MAIN AGROTECHNICAL METHODS OF CULTIVATION OF ORNAMENTAL BUSHES FOR EXPOSITION ZONES AT SANATORIUMS AND HEALTH-RESORTS

The article suggests to use the main agrotechnical methods of cultivating ornamental bushes for exposition zones such as a nursery garden, arboretum and eco-garden at sanatoriums and health-resorts. This is done to ensure better soil fertility, favorable growth and fruiting of ornamental bushes as well as their protection from plant pests and diseases.

**Introduction.** Agrotechnical methods contain a complex of measures on plants maintenance. With proper care plants are less susceptible to diseases and vermin damage. After large plants planting establishment mainly depends on care with necessary points such as: soil treatment, weeding, watering, fertilizing, pruning, insects and diseaseless management.

Agrotechnical methods carrying out in demonstrational sites increase soil fertility, improve its physical nature which is totally beneficial for growth and fruiting of ornamental bushes. Soil as roots habitat is the base of beauty for ornamental plants.

The most frequently occurring problems of plants in different sites are decrease in water and minerals supplying. Besides, this problem cannot be solved by watering and fertilizing. Deficit of necessary substances appears as a result of insufficient activity of roots for the regular functioning of which oxygen and water are necessary. Salt content should be rather low otherwise water is not soaked by the root. However, in the process of construction, planting of greenery and just during exploitation of exposition zones soil in root zones of ornamental bushes is trampled down, firmed up or salinified. Besides, a part of root zones is covered by hard waterproof coatings. As a result, water-air soil regime suffers, symbiotic micorizofforming fungi and other useful soil microflora form. This leads to weakening, partial drying off and mortality of ornamental bushes [1].

**Main part.** Taking care for ornamental bushes of exposition zones in sanatoriums and health resorts is carried out regularly. About a year before establishment of the zones soil of the lots is to be tested on the presence of destructive insects: May beetles, snapping beetles larvae, tiger moths, cut worms etc.

Lots that will turn out to be very contaminated are exposed to general treatment and are left under black fallow for a year. In the process of soil treatment destructive insects are destroyed with their nests and rodent nests are destroyed, too. Besides, weeding takes place as weeds in the majority of cases are disease carriers.

On the first stage of the lot establishment under exposition zones proper soil preparation is needed.

It includes deep digging and scrupulous weeding. Measures on soil improvement include: airing of root zones of bushes; lightening of mechanical composition by organic additives; application of different reagents for acid and salt balance changing. Standard set of procedures includes airing, surface mulching, deep mulching (drilling on depth of about 40 cm with followed organics filling) and also application of micorizofformings. Fertilizing and stimulating agents are applied for the most effectiveness [1].

Soil processing of exposition zones is carried out with the help of black fallow. Under the conditions of the Republic of Belarus depth of primary plowing is 30 cm. On sandy, sabulous and light loamy soils sowing and plowing in of green manure crop is practiced: (legumes: tare, lupine etc.) for soil fertility improvement. For the purpose of airing improvement of heavy soil sand, peat or wood dust is added.

Soil is purified from weeds not less than 4-5 times for vegetation season. The first bursting in the period after soil release from under the snow is very important. In the period of continuous dry season plants are watered at the rate of 1-2 buckets for a bush. Young or recently planted bushes with a weak root system are watered, too [2]. Excess amount of water during snow melting or heavy showers are harmful for root system of the majority of ornamental bushes. On flood-prone soil lots it is impossible to set out lilac, rhododendron, Paeonia suffruticosa Andrews, roses, Philadelphus etc. In this case elevated hills or high seedbeds from which water can flow down quickly are built for bushes [3]. After watering soil around plants is always stirred, that is around high bushes pans in diameter 2-3 m are cultivated and around low – 1–2 m. Near decorative borders and live fences zones are stirred from each side by the width of 0,5 m. Watering takes place in the evening, usually, in two stages that provide high irrigation [2].

Derno-podzolic soil of the Republic is not enough provided with nutrients. That is why nitrogen fertilizers are applied - 40-60 kg/ha of active ingredient. Thus, calculated using of ammonia nitrate is 100–170 kg/ha. Phosphorous and potassic fertilizers are applied in an amount of P60, K90;

organic – 40–60 t/ha once in 2–3 years. Mineral fertilizers are better to apply in between inter-row spacing at the depth of 10–15 cm together with organic that increases the effectiveness of the later ones. At simultaneous applying of organic and mineral fertilizers the amount of the both fertilizers are decreased by two times. The first additional fertilizing by mineral and organic fertilizers in the dry and liquid form is carried out in spring before the vegetation period, the second – in the first half of summer. Microelements play an important role in the development of plants. They include: boracium, manganese, zink, cuprum, cobalt, natrium etc. Manganese and boracium are applied in the amount of 0,2 g/m<sup>2</sup>, that has a good effect on growth and flowering of ornamental bushes [2].

A part of fertilizers is used for acidity control. Buhrstone, dolomite powder, wood ash decrease acidity. They are applied under *Paeonia suffruticosa* Andrews, roses, lilacs, *Philadelphus*. But it is not recommended to apply these fertilizers for rhododendrons and *Hydrangeas* [3].

While taking care of the crown its thinning which can be sanitary, shaping or pollarding is the main measure. In this case dry and injured boughs and branches are cut down; a crown is shaped in a proper way; thick-growing plants are thinned.

Cutting of dry boughs is carried out in summer. All the other cuttings are carried out in autumn after the end of vegetation period and also in spring before leaf flushing. Soft thin branches and sprouts are cut down by garden clippers or branch removers. The essence of crown thinning is in making it equal permeable to light and good ventilated by cutting down old intertwist and thick-growing sprouts. By shorting and cutting down of one sprouts and not touching the others it is possible to control development of the crown properly.

For leaf-falling bushes the proper cutting is necessary as it provides not only good growth and leaf formation but also regular intensive flowering. In case that cutting down is not carried out plants will continue to bloom, however, the quality of the blooming and their growth will be considerably lower.

Sometimes loss of chimeric can occur when canes with multicolored leaves can return back to the initial form (with green leaves). In this case canes with non-multicolored leaves are necessary to be cut down “on the ring”.

Usually they are larger sprouts than sprouts with multicolored leaves. If they are left they are gradually becoming dominants as bottom sprouts. As a result the plant completely returns back its green form.

For the group of everlasting bushes died off, ill and malpositioned boughs can be cut down in any time of a year. Sprouts damaged by frosts is better

to be cut down in April-May when shoot buds starts to swell as sprouts forming after summer or autumn cuttings can be damaged or die in winter. That is why their cutting is necessary to carry out in early spring.

Some everlasting bushes and semi-bushes need more intensive cutting supporting their small size and increasing blooming potential, for example, trailing mahonia [4].

Beautifully blooming bushes are set out on lots for receiving flowers and ornamental fruit; that is why cutting stimulates appearing of new buds and seed-buds. All beautifully blooming bushes in their turn can be divided into three groups according to the differences in cutting [5].

The first group includes plants in which annually sprouts appear on the periphery but not inside or at the crown base; by this reason minimal cutting should be applied to these bushes. It consists of procedure of crown forming during the first years of planting; for this reason all weak, curved and overlapped boughs are cut down. More mature plant undergoes cutting only in extreme cases by removing dried out or broken boughs and also sprouts spoiling its appearance.

Plants forming the second group are characterized by the fact that flowers appear only on the last year’s sprouts. After the end of the blooming period bloomed-out boughs are taken away leaving the strongest this-year-sprout. Besides, it is necessary to cut down all damaged boughs and weak young sprouts that are not able to provide good blooming in the forthcoming year. The similar cutting is carried out during all consecutive years. Thus, about a quarter of old unvital boughs undergo constant complete cutting to provide increase of young strong sprouts which will also be able to bloom next year.

As this group is very big and includes a large variety of plants in the technic of their cutting there are also discrepancies, for example, if we take *hydrangea* it is better to take away its deflowered sprouts not after the blossom period but in spring as they protect the plant from frost-killing in winter.

Plants that belong to the third group are in blossom exclusively on young sprouts that is why they are exposed to the heaviest cutting in spring. Later this measure makes it possible to receive intensive increase of strong young sprouts which produce splendid blossom in the present summer or autumn [5].

Cutting of ornamental-deciduous bushes doesn’t have such a variety of approaches as in the case of beautifully blooming bushes. That is why ornamental-deciduous bushes (*black elder*, *white dogwood*, *ninebark* etc.) are cut every year in early spring by shorting dozens of boughs to get as much

as possible new sprouts on which strong beautiful leaves could grow [5].

Forming of the live fence is a complicated process and it starts from the moment of planting as just on this stage it is necessary to fulfill a number of the following conditions: ditch digging on the depth of 30 cm; mold laying on the bottom of the formed ditch; setting out of plants at the distance of 25–45 cm depending on their species and growth peculiarities; heavy watering of the plants [5].

During the first year ornamental bush undergoes cutting only in case of too long sprouts appearing which may prevent forming of a beautiful nice fence later on.

Next year the amount of cuttings is increased taking away till one-third of one-year-old sprouts of top and side parts of the plant. To preserve one and the same height live fence regularly is exposed to trimming from the top by cutting down all new sprouts.

Young live fences are exposed to trimming till three times during the season; when the plant comes in the age of maturity and becomes more attractive the number of trimmings are either on the same level (if it slowly grows) or increased till six times (if a bush actively grows during the entire vegetation period). Thus, the first trimming is to be done before budding, i.e. approximately in March-April [5].

To enforce reflorescence trimming of roses and spireas takes place in summer. Deflowered branches of climbing roses are exposed to taking away. Sprouts of reflorent species are exposed to reduction not more than by 1/3–1/2 [3].

Planting and seed material of all categories (young plants, seedlings, off-shoots, rootshoots and seeds) are allowed for planting when it is healthy. Conditions of exposition centers are regularly inspected as well as a number of insects and diseases for disease development prevention and mass reproduction of harmful insects [2].

Ornamental assessment of plants is calculated according to L. N. Rozhkov methods [6].

To the first category of ornamental assessment highly decorative trees and bushes relate. They are characterized by good development of a crown and excellent condition, by originality of a crown and trunk form, by bright colors of leaves, by abundance of flowers and decorativeness of fruit. To this category all ornamental forms (weeping, pyramid-shaped, purple-leaved etc.) relate.

Plants that preserve their natural habitus, that are in good condition and have a rather ornamental crown and trunk relate to the second category.

Plants that belong to the third category have a vivid suppression, are behind in growth, and cannot reach their regular size in this age. A crown

and trunk of such plants are deformed. Condition of the plants is satisfactory.

Too suppressed and poor-developed plants belong to the fourth category. Condition of the plants is poor. The majority of them has dry branches, short-lived, low-ornamental and is subject to removal.

Representatives of the fifth category – types with more than a half dried-off crown, they are taken away.

Besides condition and decorativeness assessment landscape assessment also takes place. Compositions forming the center or core belonging to the first category of ornamental assessment are related to the first group of landscape assessment; to the second group – forming important group units, massif and also plants of lane plantings and life fences. Plants that include other elements of park and garden composition belong to the third group; to the fourth – plants of thick planting; samples that do not match with the composition, suppressing valuable ornamental plants and are to be destroyed belong to the fifth group [6].

After finding out diseases and depredators protective measures take place: sanitary-and-prophylactic measures, biological control measures and chemical treatment.

First year after autumn planting roots of the bushes are warmed in order to avoid frost injuries. Some types of ornamental bushes of the following species planted long time ago but rather winter-resistant need warming: weigela (*Weigela*); hydrangea (*Hydrangea*); willow (*Salix*); cotoneaster (*Cotoneaster*); forsythia (*Forsythia*).

Animal dung, humus, peat, wood dust, moss, fir twigs and spunbond can be used as warming material. Animal dung, peat and humus are the best of them. They are not only strengthening the root system and are a good fertilizer but it is not necessary to clean them up in spring. Animal dung, humus and peat are spread in layers by 10–15 cm, wood dust – 15–20 cm. Radius of heat layer is to exceed radius of roots by 20–30 cm. If it is a group planting all the area is heated [2].

In case of finding out newly-formed injuries on the sprouts of ornamental bushes it is necessary to cover them with garden paste or oil-based paint on natural boiled oil, prior having rubbed down injuries with the help of a sharp knife. It is necessary after taking rot away to sterilize old wounds with already rotted wood with 5%-copper spray, by flame of a blowlamp and only after that to cover them with garden paste. It is necessary to remove mortified bark layers, moss and lichen from the sprouts of adult bushes annually in spring.

It is better to carry out cleaning with the help of metal scrapers or scrubbers. Rubbish is to be gathered and burnt. In spring and summer appearing sprouts on trunks are to be deleted by cutting

on the ring. Sprouts appearing at root neck and root stalks are to be cut down at the base of a sprout without leaving even the smallest stump. Sprouts of young bushes injuring by gnawing beasts (hares and mice) are to be bound with fir twigs or cane 1 meter in height. More often such a protection is needed for tree-shaped types, lilac etc. [2].

**Conclusion.** So, a complex of agrotechnical methods of cultivation of ornamental bushes for the creation of expositions in sanatoriums and health resorts helps to provide soil fertility, improvement of its physical characteristics that in its turn will have a benefit on the development and blooming of the ornamental bushes, it also will increase plants ability to resist to unfavorable winter conditions, diseases and harmful insects.

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