

watered heavily. The aim is for a low cost landscaping product, not the higher quality garden centre trade.

A. HARGREAVES: Has any work been done in this country using wood chips as a mulch and for weed control in small containers?

M. SCOTT: Efford E.H.S. worked with peat mulches which were best for weed control, but were expensive and difficult to apply in small containers. Spraying is more cost effective.

D. GILBERT: There seems to be some contradiction in shading and outdoor misting; has outdoor misting any place in the U.K.?

A. DOWN: In the U.S.A., outdoor mist is used for evergreen cuttings, but there are large areas of shaded mist. It would not be feasible here because of wind.

NURSERY STANDARDS AND QUALITY CONTROL IN SWEDEN

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Like most countries the nursery industry in Sweden has its own standards for nursery stock. These standards however have, by tradition, been adapted to the unofficial international standards for nursery stock in Northern Europe.

The difference between Sweden and other countries is that our standards were made compulsory some years ago. This means that today no single woody plant might be sold unless it complies with The New Official Standards for Nursery Stock. The official and the former trade standards are very close in their requirements. This means, in practice, that the new official rules are a revision and an elucidation of the former nursery standards and are furthermore made into law.

The purpose of this law is to create a consumer's protection. The background for this is that the trade with nursery stock changed drastically during the last 10 to 15 years. Briefly, the distance between the producer and the consumer has increased. Earlier nursery stock was produced and sold locally but today plants are shipped over long distances, from abroad into Sweden and from the southern part of the country to the mid- and northern parts. Furthermore, nursery stock is today sold through many new non-professional channels.

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Until now I have only spoken about nursery standards but these are only one part of The Total Quality Control of Nursery Stock in Sweden.

Quality Control of Nursery Stock. The mainpoints of The Total Quality Control of Nursery Stock are:

1. The rules comprise all woody nursery stock, except forest trees (for lumber production). Also strawberry plants are included in the control.

2. The plants must comply with certain minimum requirements in regard to quality, health, and labelling.

The requirements for healthy plants states that they must be free from serious pests and diseases like Dutch elm disease, fireblight, and other bacterial diseases, as well as virus. On the other hand, stock with minor attacks of less harmful pests and diseases like mildew, scab, aphids, etc. might be accepted after controlling measures are taken.

The requirements of labelling plants are mainly connected with retail sales and states that every plant (or bundle) should be marked with Latin name, cultivar name, Swedish name, name of the garden center, rootstock of fruit trees, and hardiness zone. The requirement for hardiness classification is due to the great variation in climate within Sweden.

In the wholesale trade the requirement of labelling is limited to bundle-marking with Latin name, or cultivar name, and rootstock of fruit trees.

3. The authority that is carrying out the quality control is The Plant Inspection Service, which is a branch of The National Board of Agriculture. With a staff of 20 plant inspectors they are trying to control the plants in about 700 nurseries, garden centers and other retail outlets. Besides that they are controlling the imported nursery stock. The import is very big, today about 50% of the total sales in Sweden.

If plants do not meet the requirements, the plant inspectors have the authority to prohibit sale. This means that the plants might not be sold but are allowed to grow on in the nursery to reach acceptable status of quality or health. Plants in very poor condition, mainly due to serious pests or disease attacks, can be destroyed. Imported plants which do not meet the requirements are not allowed to come into the country.

Nursery Standards. I am now going to talk about quality of woody plants in respect to nursery standards. Few questions might be as controversial as those connected with quality. Professional nurserymen, however, can easily judge good plants from bad. But I guess it is a little more difficult if you ask them to write down what they mean by good quality. Our

experience in Sweden is that you might be able to describe in words maybe 70% of the quality criterium for a group of plants, like roses, but the remaining 30% is your own personal judgment based on plant knowledge. This is due to the fact that you are dealing with a biological material with genetic variation.

If you are regarding the quality conception you can easily find two mainpoints, viz external and internal quality of a plant. The external or anatomical quality describes things like height, width/diameter, number of canes/branches, caliper, branching height, habit, and root system. The internal or physiological quality of a plant describes things like vitality and genotype.

When you are dealing with quality control you must keep both the anatomical and the physiological quality in mind. But when you are going to write rules for nursery standard you must, for practical purposes, mainly work with anatomical criteria which are easy to measure. The Swedish Nursery Standards are, for this reason, mainly a question of certain minimum sizes and number of canes or branches. This, in spite of the fact that a small plant physiologically could be of the same good quality as a bigger plant.

The Swedish Standards consist partly of General requirements for all groups of plants and partly of specific requirements for different groups of plants.

A. General requirements. These are:

- the plants should have a normal development according to species or cultivar.
- the plants should be in good physiological condition.
- etiolated shoots must not be more than 1 cm.
- the root system should be well-developed.
- plants grown in glasshouse should be hardened off.
- plants should be free from perennial weeds.
- bareroot plants should have mature shoots, without shoot or root development; species with an early vegetation might have new shoots to a length of 5 cm.
- packed plants should have their roots in a moist growing medium; shoot development is allowed to a length of 5 cm.
- container grown plants should have the growing medium interwoven with roots and transplanted every second year.

— plants with rootball should have a natural rootball; the size of the ball should match the rest of the plant, transplanting or root cutting at least every third year.

Specific requirements. The specific requirements below cover the following groups of plants: roses, ornamental trees, ornamental shrubs, vines, hedgeplants, conifers, fruit trees and small fruits:

1. Roses

Type 1, Grandiflora, floribunda, polyantha, climbing and bush roses:

The plants should have at least 3 strong canes with a length of 25 cm. Two of the canes should come from the bud union and the third not higher than 5 cm above the bud union (with some exceptions). Bare rooted roses must not be older than one year from budding and container-grown 2 years. Container size, min 2 liter.

Type 2, Tree roses:

The plants should have at least 3 strong canes from the bud unions with a length of 20 cm. The stem should be at least 60 cm. Container size, min 3.5 liter.

2. Ornamental trees:

Trees are divided into three main types: standard trees (with a crown and an unbranched stem), branched trees and clumps.

Type 1, Standard trees should have a well-developed crown consisting of at least 3 strong, well-directed side-branches and a leader. Branching height should be at least 80 cm and the caliper min 1.3 cm (4 cm, circumference) measured half way up the stem. Street trees should have a branching height of 180 cm and a caliper of 1.9 cm (6 cm circ) measured 100 cm up from the ground. Examples: *Acer*, *Aesculus*, *Malus*, *Prunus*, *Sorbus*, *Syringa*, *Tilia*.

Type 2, Branched trees have a natural form with developed side branches which start close to the ground. Minimum height is 100 cm and the branching must start higher than 50 cm up. Examples: *Betula*, *Carpinus*, *Fagus*, *Magnolia*, *Salix*.

Type 3, Clumps are trees with at least two main stems starting from the ground or max 40 cm up. Examples: *Acer*, *Betula*, *Prunus*.

3. Ornamental shrubs

This group includes both deciduous shrubs and broadleaved evergreens. It covers a large number of plants and is of this reason divided into 6 subgroups or main types, depending on habit of growth.

The specific requirement for all shrubs are that they should have at least 3 strong canes emerging from the rootneck or maximum 10 cm above. Exceptions are *Aralia* and *Pyracantha* which are accepted with only one cane, and *Hamamelis*, *Magnolia*, and *Rhus*, which are accepted with only two canes.

The requirement of length of the canes for different shrubs varies from 15 cm to 60 cm depending on habit of growth and type.

Plants in the first three subgroups or types are allowed to be sold bare root. Plants in the following subgroups should be sold either container-grown or with a rootball. The requirement of container size varies from 1.5 to 3.5 l, depending on group.

Type 1, Shrubs: Strong growing; may be sold bare root; canes should have a length of at least 60 cm. Examples: *Acer campestre*, *Amelanchier*

canadensis, *Syringa vulgaris*. Container-grown shrubs: container sizes 3.5 l; canes min 50 cm.

Type 2, Shrubs: Medium growing; may be sold bare root, canes should have a length of at least 40 cm. Examples: *Berberis thunbergii*, *Cornus alba* 'Argenteo-marginata' (Syn.: 'Elegantissima'), *Hydrangea paniculata* 'Grandiflora'. Container-grown shrubs: container size 3.5 l, canes min 30 cm.

Type 3, Shrubs, Dwarf and Semi-Dwarf; may be sold bare root, canes should have a length of at least 25 cm. Examples: *Deutzia gracilis*, *Potentilla fruticosa*. 'Tangerine', *Spiraea bumalda* 'Anthony Waterer'. Container-grown shrubs: container size min 2 l, canes min 20 cm.

Type 4, Shrubs: Medium growing; may only be sold container-grown or with rootball; canes should have a length of 40 cm. Container size min 3.5 l. Examples: *Buddleia* spp., *Cytisus* × *praecox*, *Rhododendron* spp. (30 cm).

Type 5, Shrubs: Semidwarf; may only be sold container-grown or with rootball; canes should have a length of 25 cm. Container size min 2 l. Examples. *Cotoneaster* 'Skogholm', *Lonicera nitida*, *Pyracantha* spp.

Type 6, Shrubs: Dwarf; may only be sold container-grown or with rootball; canes should have a length of 15 cm. Container size min 1.5 l. Examples: *Berberis candidula*, *Cotoneaster adpressus*, *Cytisus decumbens*.

4. Vines

Vines may only be sold container-grown or with rootball. Exceptions are *Aristolochia*, *Parthenocissus*, and *Wisteria*, which can be sold bare-root. Container size 1.5 l. The shoots or runners may be cut back to 20 cm.

Type 1 Clematis hybrids should have 1 shoot or runner.

Type 2 All other vines should have 2 shoots or runners.

5. Hedge plants

Hedge plants are divided into 3 types, depending on habit of growth. Age and transplanting should be stated. They should also be marked "Hedge plants".

Type 1 The plants should have one cane with a length of 30 cm. Examples: *Alnus* spp.: 1/1, *Fagus sylvatica* spp: 1/1; *Populus* spp.: 0/1.

Type 2 The plants should have a length of 30 cm and have side shoots from the rootneck or maximum 10 cm above. Examples: *Berberis* spp.: 1/2, *Cotoneaster* spp.: 1/1, *Ribes alpinum*: 0/1/2.

Type 3 The plants should have a length of 20 cm with side shoots from the rootneck. Examples: *Buxus sempervirens*: 0/1/2, *Rosa nitida*: 0/1/2, *Taxus*: 2/2.

6. Conifers

Conifers are a very large group of plants and are of this reason divided into 5 main types depending on habit of growth. They may only be sold container-grown or with rootball. Container size: min 3.5 l for strong growing conifers, min 2 l for semi-dwarf or dwarf conifers. The size of conifers is measured as average height and average spread.

Type 1. Upright, strong growing types; height: min 40 cm. Examples: *Abies concolor*, *Chamaecyparis lawsoniana* 'Alumni', *Taxus* × *media* 'Hicksii'.

Type 2. Upright, semidwarf to dwarf types; height differs from 15-30 cm. Examples: *Abies koreana* (25 cm), *Juniperus chinensis* 'Blaauw' (20 cm), *Picea omorika* 'Nana' (15 cm).

Type 3. Spreading, strong growing types; spread/height: min 25 cm, general requirement: at least 3 well-directed branches. Examples: *Juniperus chinensis* 'Pfitzerana', *J. horizontalis* 'Douglasii', *Taxus* 'Densiflora'.

Type 4. Spreading, dwarf types; spread/height: min 15 cm. Examples: *Juniperus* 'Blue Star', *Picea abies* 'Nidiformis'.

Type 5. *Pinus mugo*; *Pinus mugo*, with cultivars, should be evenly grown with 4 well-directed shoots or, alternatively, a leader and 3 shoots. Spread/height 20 to 25 cm, depending on cultivar.

7. Fruit trees

Fruit trees are generally sold as standard trees which should be 2 years old. The stem should be straight with a branching height in the interval of 40 to 100 cm. The caliper measured half way up should be 1.3 cm. The crown should be well-shaped with at least 3 well-directed side branches and a leader. (Sour cherries: 4 side branches without leader.) The length of branches and leader should be 40 cm. Apple trees should be raised on vegetatively propagated rootstocks. If container-grown the container size should be 10 liter.

Espalier and cordon trees have special standards.

8. Small fruits

8.1 *Black and red currants and gooseberries*. The shrubs should have at least 3 strong canes and not be older than 3 years. The length of the canes should be: 45 cm for black currant, 35 cm for red currant, and 30 cm for gooseberries. If container-grown the container size should be 3.5 liter.

8.2 *Raspberries*. Raspberries must not be older than one year. The diameter of the cane, 5 cm above the rootneck, should be 8 mm. Length of the cane should be 40 cm.

8.3 *Blackberries*. Blackberries should be container-grown. The plants should have at least 1 cane with a length of 40 cm. Container size 1.5 liters.

This has been a summary of The Swedish Standards for Nursery Stock. How do all these new rules work in practice? After a period of three years I dare to say very well. One reason for this was the close and good contacts with the nursery industry during the work with the New Standards and the Quality Control. Of course, there have been some initial problems but today most of them are solved.

Even if the goal has been to create a consumers' protection the nursery industry has also had benefit of the new system. This because the new rules have turned into a standardisation and a reconstruction of the trade with nursery stock.

E. BATE: What happens to those nurserymen who do not comply with the standards?

L. RUDIN: If the plants do not meet the standard required on inspection they may be allowed to grow on. However, if they don't comply at the second inspection they must be destroyed. If plants are moved from the nursery the owner is fined.

B. LOCKWOOD: Who initiated the idea of statutory control?

L. RUDIN: The nursery industry made the request in an effort to overcome the competition from imports, which at that time made up 50% of total sales. There was collaboration

between the authorities and the industry and, as an extension officer, I wrote the first draft. For the scheme to work in practice rules must be practical for the producer and the consumer, and it is necessary to find a compromise.

D. GILBERT: How is the nursery inspection carried out?

L. RUDIN: It is illegal to sell plants that are insufficiently developed, so if plants are too small they are allowed to stay. It is up to the nursery to grade properly as there is a quality control at trade outlets. I have not discussed health inspection; this is only carried out at the nursery.

J. GAGGINI: Who pays for the inspectorate, as twenty inspectors cost a lot of money. Is it on a levy basis?

L. RUDIN: It is a combination of government and nurseries. Nurseries pay a levy according to size. The inspectors are on a part-time basis and would equate to ten full time.

W. MATTHEWS: Do we need plant standards? Should we let market forces decide standards? In the long term will standards remain the same, and will the multiple retailers stipulate quality standards in the future?

B. LOCKWOOD: Certainly the present standards have changed since the bad winter.

B. HUMPHREY: I agree market forces will determine grades, but a huge volume of sales are still on tenders which demand standards.

W. WATKINS: Is there a standard price for the product in Sweden?

L. RUDIN: No, there is no government interference in pricing.

R. EVISON: Are there standards for liners traded between nurseries?

L. RUDIN: Only a general requirement; there are no specific specifications for liners.

K. HAMILTON: How significant is the nursery industry in Sweden for the government to take an interest?

L. RUDIN: The primary value of nursery stock is less than that of food crops. A result of the regulations is that now there are no cheap imports of poor quality stock coming in from Holland through mail order. There are 1200 hectares of nursery stock in Sweden, with a value of £10 million.

P. WOOD: Are inspectors selected from bureaucratic or practical sources?

L. RUDIN: They need a practical background for the job.