

Engelsk

Tending of young stands



SKOGKURS
Forestry Extension Institute



This booklet is designed for use in courses for foreign workers. The booklet is intended as training documentation and knowledge base for courses organized by "Activity in Forestry".

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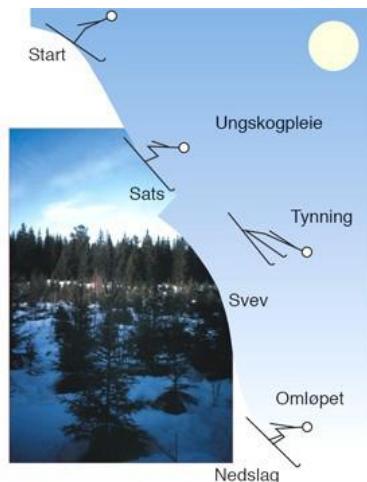
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What is tending of young stands?

Tending of young stands is a targeted selection of “future trees”: the trees of the wanted species that have the best quality. These future trees are “freed” by release cutting, wholly or partially, through tending. After tending the future trees should be evenly spread over the area.

The significance of the regeneration and Young forest phase can be compared with a good ski jump. In order to achieve a stylish jump through the thinning phase and get good length with a rock steady landing through the main logging, one must have a good in-run slope through the regeneration and a good take-off in the young-forest phase. Thinning can be compared with small adjustments when floating in the air.

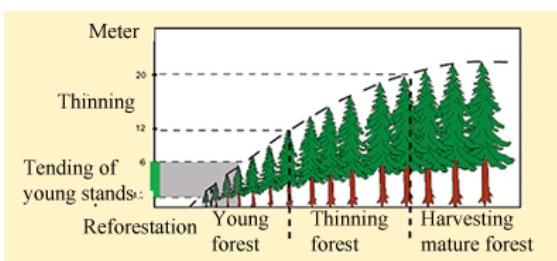


What is a future tree?

This is essentially the main species, and the trees with the best developmental potential.

Why tending of young forest?

The purpose is to preserve and develop the production possibilities in a young forest stand, so that the future earnings will be as large as possible. If there is a need for tending, the value of the stand will be reduced if tending is not done. The reason is that the growth of the futurees then will be inhibited and the quality reduced.



The time a forest stand uses to go through the various development stages from one regeneration logging to the next (in the next generation), is called a rotation cycle. The figure shows the height development on good site quality.

When should tending of young forest be done?

After logging, when a new forest stand is established, and regeneration phase is over, tending should be done when the stand height is between 1 and 6 meters (if needed), see figure.

In neglected stands, where tending should have been done earlier, it can be performed until the stand heights ca. 8 meters. Late tending should only be done when all tending of younger stands is finished, because it is expensive and should have low priority.

Release cutting, cleaning, regulation

Tending of young forest can and should be carried out in different ways, depending on basis and purpose. The methods are often combined, and the theoretical distinctions are usually varying during practical work.

Three main terms should be focused:

Release cutting of future trees

This means to give future trees enough space, so that competition from other trees does not inhibit their growth. Mainly the area around the future trees should be treated.

Cutting height can vary, since the goal is to prevent harmful competition. Release cutting is mostly used when the stand shall not be thinned later.



Release cutting will provide sufficient space for the future trees, so that competition from other trees do not inhibit development.

Cleaning between the future trees

This means that all the trees between the future trees are removed. The method is particularly relevant if the stand is to be thinned later. Cutting height should in that case be low.

Regulating the number of future trees

The term is used when it is necessary to reduce the number of future trees.

Tree species

In most cases spruce and/or pine are the main species. In areas of Norway where silver birch (*Betula pendula*) and noble broadleaves (elm, ash, beech, hazel, oak, lime) is growing naturally, these species can also be the main tree species. See instructions for what the main tree species should be.

Replacement trees of birch, aspen, grey alder and black alder

When the main conifer species are unevenly distributed, replacement trees should be left in openings in the stand. Time is saved by not cutting these trees, and in addition the total growth in the stand increases.

Tree species with large height growth in the youth phase, such as birch, aspen and alder, requires distance to the future conifer trees. This means that we do not leave the mentioned species of broadleaves in openings with a diameter less than ca. 4 meters, when the surrounding spruce is 2 meters or lower. This gives no permanent removal of the broadleaves, since these species normally will grow up again from the stump (birch and grey alder) or from the root (aspen), but it provides a needed growth lead for the spruce.

In larger stand openings replacement trees should be left, preferably trees that are lower than the main species.

For pine, which have faster youth growth than spruce, or where the spruce has an average height of 3-4 meters or more, it is less danger that the broad-leaves do damage after tending if these are clearly lower than the main species. If many new broad-leaves are growing up naturally, and these trees get an early lead to the main species, several interventions may be required. In stands with high site quality broad-leaved replacement trees can be valuable also as future trees. Broadleaves will need longer distance to neighbouring trees than spruce to get an optimum development.



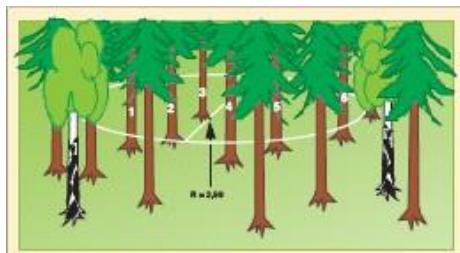
Save rowan and willow!

Rowan, goat willow and partly bird cherry, willow and juniper and others are important grazing trees for deer. Small trees of these species should mainly be left, especially where grazing pressure is high.

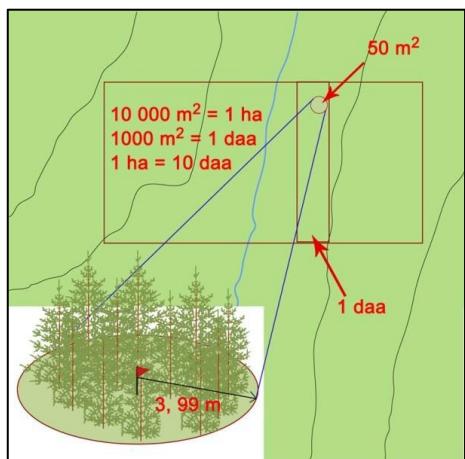
Number of trees

Number of trees per area unit is determined as follows: The trees are counted in a circular area with a radius of 3.99 meters, see figure. The circle represents an area of 50 m^2 (1/20 decare).

All conifers that are higher than 2/3 of the height of the largest conifers within the circle are counted, that means all the trees assumed to be in the future stand. Trees smaller than this will only to a small extent influence the growth of the larger trees. The number of conifers and broadleaves should be listed separately. The number of trees in the circle multiplied with 20 give the number per decare, and 200 per hectare. The number of trees should always be registered. We should also note which tree species that exist, since it may affect what you choose to do in the stand.



Registration of spacing may be done by using a 3,99 meters long cane.



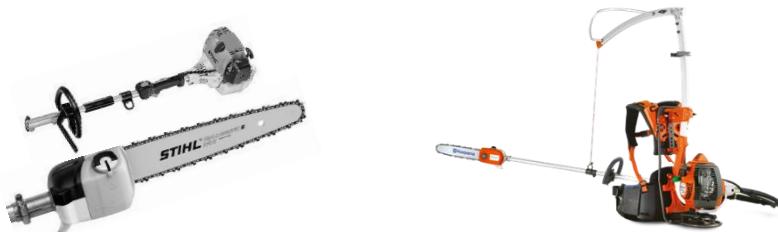
Number of trees within the 3,99 m circle multiplied by 20 gives the number of trees per decare.

Tool selection

Brush saw



Pole-mounted brush saw



Brush saw is suitable for tree heights of 1-5 meter. Pole-mounted brush saw is easier to use. Flexible in relation to different tree dimensions and terrain.

Both these tools provide good working positions and a good overview for tree selection.

Chainsaw is not recommended. Kickback danger is especially great when working among shrubs and small trees. It is also generally less efficient and provides poor working positions, as well as more limited overview during work than the other two options.

Pruning scissors (Pruners)

When young forest tending is performed very early, a pruner can give good results. A regular axe is dissuaded.

If double-top, one top can be cut away so that only one top develops. This should be done before the shoot is thicker than 2-3 cm because of decay and hook development hazard.



If double-top, one top can be cut away so that only one stem develops.

The brush saw

This saw was constructed in the 1950's. The engine is quite similar to a regular chain saw. At the end of the rig tube there is an angle drive where the brush saw blade is attached.

For young forest tending saws with engine size at least 40 cm³ or 2 kW should be selected.

Maintenance

Equipment needed in the forest:

- Combination key
- Equipment for filing
- Tool to change blades
- Small screwdriver
- Appropriate wrenches



Correct selection of tools and setting of the equipment, as well as best practices for both maintenance and work technique ensures good progress and a good result.

Extra blade and locking nut, starting cord, starting spring, spark plug and screw to the angel drive oil filling hole, in addition to heat resistant ball bearing grease to the angle drive are also recommended.

The blade guard (behind the blade) should be replaced as soon as it shows signs of cracks or deformation. The nut that locks the saw blade to the worm gear should be replaced when it can be screwed to the blade only with your fingers.

Maintenance intervals and routines

8 hours

- Clean the exterior of the saw
- Wash the air filter
- Check harness, stop button, blade screen, saw blades, filing
- Check nuts and bolts.

40 hours

- Check starter house, spark plug, vibration absorbers
- Check the grease level in the angle drive. Correct level is 2/3 full.
- Clean the cooling ribs, around the carburettor and start casing.

- Make sure that sideways angle of the saw teeth is correct.

160 hours: Clean the fuel tank and around the flywheel.

The saw blade

The saw blade can achieve approximately 12 000 rotations per minute (peripheral speed approx. 450 km / h). Use only brush saw blades recommended by the brush saw producer. Using the wrong type of blade can cause serious accidents.

Check regularly that the blade has no cracks by striking the blade with a spanner. When the blade is without damage there will be a steady long tone, while a dump, often jarring sound indicates that the blade is damaged and must be replaced immediately.

Filing and blade setting

- File with a 5.5 mm round file and file holder. The file holder should be used to obtain the correct side plate angle and a file angle of 15 degrees.
- At every petrol filling the teeth should be sharpened, and be filed more thoroughly when needed.
- The sideways angle of the saw teeth should be checked with the appropriate set iron every week, and also after stone cutting and when the saw blade has been in a squeeze.
- A good working position when filing, blade setting and changing of blades is important. On new blades the blade setting should be controlled and teeth edges sharpened before use.



A good working position when filing, setting and changing of blades is important.

The harness

Incorrect setting gives wrong and adverse impacts on back, neck and shoulders. The harness shall have a quick release for use by fire, attack by wasps etc. Suspension

hook shall be in order and closed during operation so that the saw cannot be lifted or fall off by throws, falls etc.

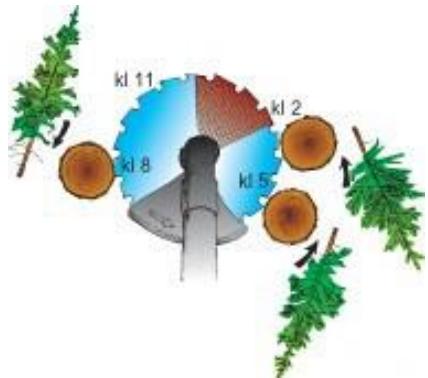
Adjusting the harness

It is important that the harness is adjusted and adapted to each user.

- Take on the harness
- Hang the saw on the hook and adjust the shoulder and cheststraps so that the load becomes equal on both shoulders. The breast plate should be located in the middle of the chestbone.
- Adjust the suspension hook so it hangs 10-15 cm below the hip ridge. The saw hangs in the correct height if your arms are naturally bent when your hands are gripping the handles.
- When the harness and suspension hook is properly adjusted and the fuel tank is full, the saw blade should be in a position right in front of the user and hang ca. 40 cm above the ground. In rough, rocky and steep terrain it may be useful to balance the blade a little higher.
- After some time the harness must be adjusted because of tension in the straps.

Control of the felling

- Always give the blade full speed before it is set against the tree.
- The saw is controlled with the handles while the saw all the time during the work should be in close contact with the body.
- Use your legs and hips when the saw is moved toward the tree.
- The blade should be given a marked "feeding" which also determines the felling direction. Do not feed too strong. If so the tree can be beaten off.
- It is important to tilt the blade in the touching point (on the stump) to influence the best felling direction in addition to the rotation of the blade.



Avoid setting the blade to the stem in an area between 12 and 2 o'clock

By insufficient felling-technique the trees will fall in all directions, but with proper technique the trees can be controlled into the desired direction.

We can divide the blade into a dial of a watch:

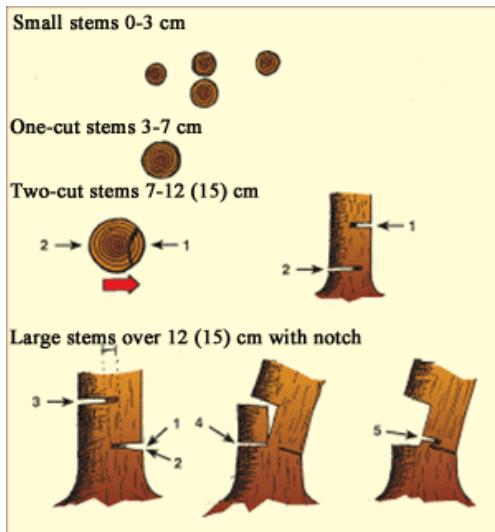
The throw zone is between 12 and 2 on the blade, and is "the forbidden zone". If we set the blade against the tree in this zone, there is a great danger to get a throw in the saw that causes stone cutting or damage to remaining trees.

If the tree top should fall forward - the area from 8 to 11 o'clock is set toward the tree and the root is pushed backwards.

If the tree top should fall backward - the area from 3 to 5 o'clock is set toward the tree and the root will slide forward and sideways.

Cutting technique

When trees are small (0-3 cm), the saw is used as a scythe so that many trees are cut in one sweep. One-cut stems are 3-7 cm, two-cut stems 7-12 (15) cm. When cutting two-cut stems, the first cut should be in the felling direction and the second cut on the opposite side (back). The second has to be below the first. If there are many two-cut stems in the stand, we should consider using a pole mounted chain saw.



Cutting technique. The specified numbers will vary with the saw- and blade size.

Pole mounted chain saw

This saw is easy to handle and demands easier work techniques than the brush saw. It gives less danger of throw and has good efficiency especially when the stem dimensions in the young forest stand increases. For many with less practical experience and work technique, this saw can be a very good option. To use a telescopic rigtube is not recommended.



Maintenance

As for brush saw. The difference is the chain instead of the saw blade.

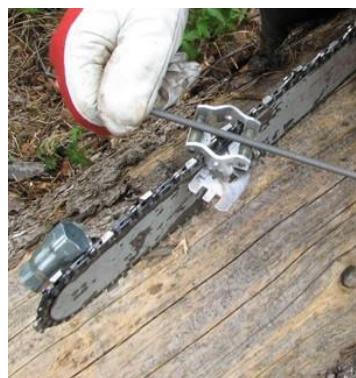
Sword and chain

Short sword is recommended in order to minimize friction and thus ensure enough engine power to the chain. The chain is often 3/8 inches. It is important that the bar groove width fits to the saw chain thickness.

Filing

A new saw chain must always be filed before use. Factory filed saw teeth may feel sharp, but this filing is by no means good enough.

- Check that the chain riders have the right under-position. Use rider measure.
- Then file the chain teeth using rolling measure and correct file dimension. This ensures correct file angle, impact angle and edge angle.



A new saw chain must always be filed before use

Harness

To the Stihl pole saw an ordinary brush saw harness is used. See description under "brush saw". The saw is secured in the hook on the harness, so you do not risk touching the cutting equipment by accident.

The pole saw from Husqvarnas is worn in a harness on the back.



Harness setting

- The settings as for the brush saw, with the exception of the suspension hook height (Stihl).
- The hook must be over hip ridge height. Proper height is when the saw can swing around the suspension point (the hook) during labor without being lifted from the hook (Stihl).

Protection equipment and security rules

- Safety distance is at least 15 meters for the use of brush saw or pole mounted chain saw. The saw should not be used if somebody are situated within the safety zone.
- Stop the engine when it is necessary to remove twigs that are stuck between the saw blade and the protecting shield. Check regularly that the saw blade on the brush saw has not been cracked.

Personal protection equipment

- Helmet with hearing protectors and protecting visor or goggles.
- Boots with good grip pattern.
- Use jacket with protective color, and have a one-man package (first aid equipment) in the breast pocket.
- The saw: Should be maintained and in good condition.
- Harness: Correct harness setting. The locking hook in which the saw is hanging should be completely closed, and the quick release must be in order.



Practical implementation of the work

Practical work should match the plans that are made in advance. Correct choice of tools and adjustments of the equipment, as well as good routines for both maintenance and work technique, ensures good progress and a good result. In particular, it should be emphasized that all tools must be sharp to function satisfactorily.

Internal control during the work

Internal control should be implemented according to the instruction. Remember to write the results on the control form and to sign it. Control is most easily done with a pole at 3.99 meters. Number of trees per decare is found by multiplying the number of trees in the circle with 20 See page 7, number of trees.

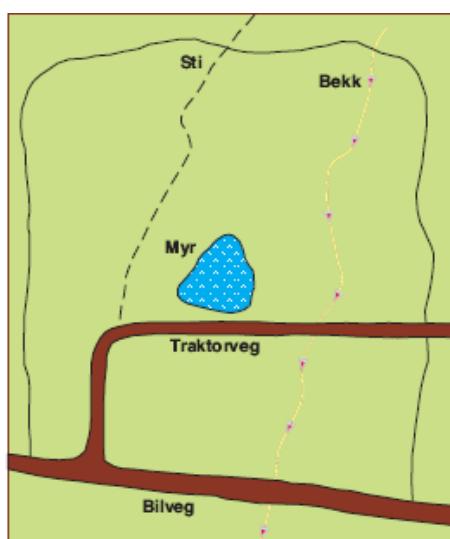
Work planning

View the work instructions, where the following conditions should be mentioned:

- Which tree species should be the main tree species?
- Number of stems that are to be left /released after tending?
- Should the work be done as clearing, release cutting or regulation?
- Should tending be carried out several times and /or is thinning planned to be implemented later?
- Treatment close to rivers, lakes, marshes due to multiple-use considerations.

Study the terrain and plan the work according to the sun, wind and slope direction:

- It is easier to work along terrain contour lines.
- Avoid crossing streams, ditches and trails during work.
- Avoid leaving felled trees in or over these.
- It is best to work with the sun at the back or at the side.
- The wind should preferably come from the front or sideways.

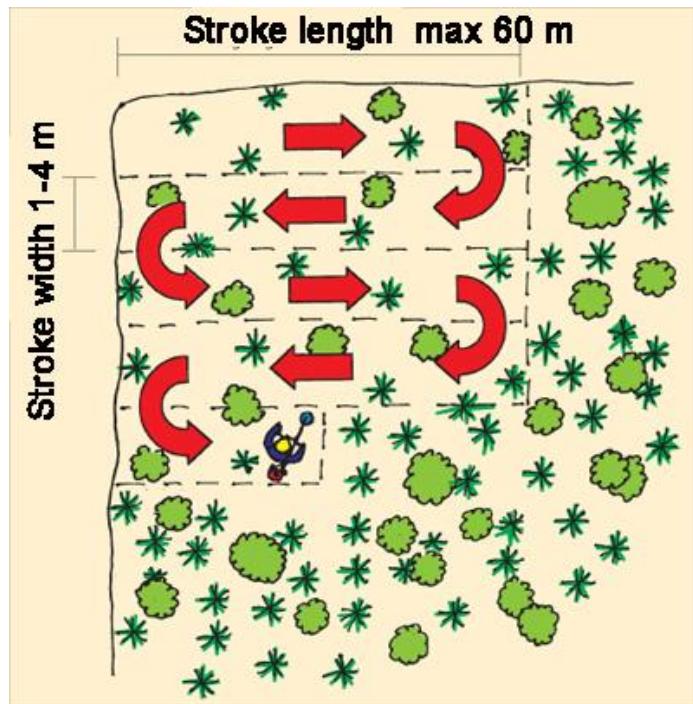


Customize the work to local conditions

Stroke width is the width of the cut when you go forward through the field.

Normally, stroke width should be about 2 meters, but can vary from 1 to 4 m depending on conditions. Narrowest in dense forests and when using pole mounted chain saw.

Stroke length is the length of the "stripe" which cleared before turning and returning. Adjust the stroke length so that you can come back to the gasoline stock before the tank is empty. Normally 60 meters is a maximum stroke length, but it should also be adjusted for streams, ditches and trails in the field. Start at the bottom of the field and work along terrain contour lines.



Control the number of trees during work

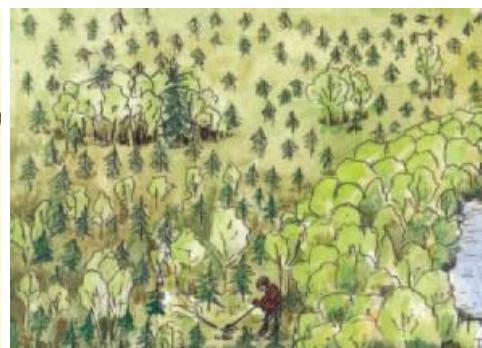
Self-check is carried out according to the instructions. Remember to list the results on forms and sign with your name. The check is most easily carried out with a rod of 3.99 meters. The number of trees per decare are found by multiplying the number of threes in the circle by 20 (see page 7).

Important environmental considerations and the Norwegian PEFC forest standard

The Norwegian PEFC Forest Standard and its certification system, aims to contribute to a sustainable management of the forest resources. The standard contains certain points we must relate to when working with rejuvenation measures such as tending of young stands. In the textbox you can see the main points you must know about.

Main points

- Be cautious when working close to cultural monuments.
- Do not tend inside of the buffer zones along rivers, streams, waters, marshes and wetland areas, unless this is approved by the certificate holder.
- All waste and garbage shall be disposed of in garbage bins or containers. Empty oil- and fuel cans are regarded as special waste, and must be delivered to an approved waste facility. Gas stations often accepts such waste.
- Do not tend inside of key habitats, unless this is approved by the certificate holder.
- Trees, twigs and branches shall be removed from trails and tracks as soon as possible.
- Avoid leaving trees, twigs and branches in waters, waterways, smaller streams and ditches to roads.



Garbage

All sorts of garbage should be taken out of the forest and thrown in the garbage container/trash bin. Empty oil and gasoline cans are hazardous and should not be placed in ordinary waste, but collected and delivered to gas stations and others who may receive it. Remember also personal garbage such as milk cartons, bottles, containers (empty smoke packs, candy wrappers and more) and newspapers. Check that nothing is left behind before you leave the area.

