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**A. K. Garmaza**, PhD (Engineering), assistant professor (BSTU)**SECURITY IN THE DEVELOPMENT OF BLOWDOWN  
WINDBREAK WOODCUTTING AREAS**

The article analyzes the cases of injury rate in the forestry as well as accidents in manufacturing. The author highlights the most dangerous types of logging work – the design of wind fallen trees areas. The principal requirements to the works employed in this type of work are described and the safest ways of with the use of petrol driving tools tree telling are considered.

**Introduction.** According to the data of the Department of State Labour Inspectorate, 197 workers as a result of accidents were killed in the organizations of the republic in 2011. The worst situation of the lives loss is in the forestry sector where the frequency rate of fatalities (number of deaths per 100 thousand of employees) is 16.8, while the frequency rate of fatalities in the industry – 4.6 and in the Republic – 4.4. The indicator of occupational injury fatalities in forestry is not comparable to the number of employees in the industry. The death toll in the forestry sector of the total number of fatal injured is 2.6% and the number of employees in the industry – 0.7% of total economy employment.

According to the head organization for health and safety in forestry UE “Belgiproles” the most dangerous types of work are logging (57% of all deaths) and the most dangerous professions – loggers, fellers (13% and 12% of all deaths).

The most difficult and traumatic technical work is felling carried out by fellers with gasoline-powered saws.

The main causes of accidents during the manual felling are: non implementation of the requirements for health and safety by officials, leaders; finding employees in a danger zone of felling trees; non implementation of parameters of tree cutting by fellers; exploitation of technically faulty manufacturing equipment; workers' access to work independently without training and examination on safety, etc.

In Belarus the annual windfall are destroyed from 0.5 to 2 million m<sup>3</sup> of wood. The development if blow down windbreak woodcutting areas are increased. The use of machines for such works is not always economically feasible because of their failure. That's why the manual felling of trees are used and the quality of its organization depends the level of injury.

**Main part.** The common dangerous and harmful factors for logging workers are: moving cars, machinery rotating machine parts, machinery, equipment, motor tool; falling trees and branches; movable and banked trees; whips, assortments; flying objects, pieces of wood, metal, chips; sharp

edges of equipment and tools; increased levels of dust and gas workplace air; excessive noise and vibration, lack of illumination of the working area, adverse weather conditions (high and low temperatures of air, lightning, rain, storms, ice, fog, snow); poisonous plants, fungi, animals, neuro-mental stress as a result of drudgery.

These factors may have on employees the following effect: possible contact with the cutting tool, rotating and transfer mechanism; injury from falling, movable trees, whips, assortment, twigs and sticks; lightning, hypothermia and heat stroke; poisoning and disease from contact with poisonous plants, animals; the negative effects of noise, vibration, dust and gas.

The developing of blow down windbreak cutting areas is necessary to allow to the most experienced workers with a preliminary and periodic medical check up and who are fit to perform such types of work; who passed the briefing, training and knowledge examination on occupational safety, fire safety, first aid and have a special license.

Only specially trained people with a license for the machine controls of this construction are allowed to the management of logging machinery, equipment and motor tool.

Workers' assignment of certain equipment, motor tool is made by order of the company.

The development of blowdown windbreak cutting areas is made by fellers with a help of wood-cutter.

Except tools and accessories required for felling and pruning the team should have a hand portable winch with a metal rope of at least 35 m, hemp rope length of 10 m, Chalker of 5-8 m length, one for each employee as well as bandage to prevent chipping damaged trees. Do not allow using steel ropes with knots and more than 10% of broken wires on one lay length a single step lay (according to the norms of steel ropes rejection).

Master organizes the cutting area work directly or through the foreman, the master's instructions are mandatory for all people working in the cutting area.

Cutting works are carried out in accordance with the approved for each cutting area map.

All workers should read and sign it. It should be made applicable to the lay of the land conditions as well as the nature, extent and direction of the wind, damage of the forest stand, territory pollution.

Work teams should be briefed about the possible dangerous situations that may arise during the work and measures to prevent them. It is not allowed to work without target. Fellers and loggers should examine the blowdown windbreak forests, to clarify the order of area development and to identify possible risk: tilted, lodged, broken trees and other hazards as well as hung branches and tops of trees.

Each tree before felling should be carefully examined and only after this the method and direction of its landing are selected. Those trees that represent the greatest danger should be first for felling.

Felling trees the top of which lies on the ground is not allowed without testing the strength of the connection between the top and the basis parts of the trunk. Such trees are felled in the following way: if a tree has inseparable part at a height of less than 1 m from the ground and the broken parts cannot be separated by hand winch or tractor from the basis then the broken part is sawed. Some stacked pads should be put under the barrel before sawing.

Sawing should be started from the top to the depth of light saw clamp then from the distance of 2-3 cm from the plane of the first cut. If a tree has inseparable parts at a height of 1 m and broken top part of the trunk cannot be separated by tractor in this case felling of tree basis is made without preliminary separation from its broken top. Tractor's rope should be attached to the basis of the tree before felling. Rope hanging on the tree trunk should be made by barling with a special hook on the end or kilbig from a safe distance.

Felling of the basis part of the tree with a broken top should be carried out at an angle of 90° degrees to the vertical plane passing through the axis of the broken parts of the tree.

Hingewood should be left twice bigger than usual then feller and woodcutter move to a safe distance. Hingewood of the basis of the tree with a broken top is cut by tractor.

If a tree has a split at any height and a broken part is separated from a tree basis the felling of the latter is made as a single tree in accordance with general safety requirements for felling.

To hem the tree by ax before felling is not allowed. It is necessary to make an undercut by petrol saw and to remove wood slices by the console part of saw guide bar.

Felling of tilted single trees with partially damaged root system is made in the direction of slope.

Tilted, broken with a crack from the basis to the top trees are allowed to be sawn only after a preliminary tightening of the lower part of the tree by band, chain or rope (4-5 turns) with a wedge tie. Undercut of such trees is made to a depth of 1/2 the diameter of the butt depending on the slope. Healthy trees with a tilt toward the felling are undercut to a depth of at least 1/3. Such trees are felled in compliance with general safety requirements for felling. To leave butt inside the ground is not allowed. Removing of lodged broken trees depends on the nature of their hanging. Every single case requires special felling methods of such trees.

If lodged tree:

- completely broken from the basis part it is removed by tractor or winch; tractor's rope (wrench) is strengthened on the basis and pushed at an angle or along the tree depending on the local conditions;

- has inseparable break from the stump the undercut of the tree is made from the breaking side with a saw cut and leaving the hinge of 4-6 cm by width, after this a tree is felled by a tractor or winch;

- has inseparable break at a height of 1 m from the ground (broken top part of it firmly connected to the basis) it is felled together with the breaking; a tractor's (wrench) rope is fixed on the basis of the tree before felling, then undercut is made perpendicular (at an angle 90°) to a vertical plane passing through the axis of the broken parts of the tree and finally saw cut is made leaving hinge of 2 cm more than usual. Such trees are landed by tractor (winch);

- if a lodged tree hung with everted root system cannot be landed by tractor (winch) then tractor's rope (winch) is attached to a tree at the angle of 90° to its longitudinal axis, the undercut is made from the side of tightened rope at the depth of 1/2 the diameter of the tree basis then it's time for saw cut with leaving the hinge width of 4-6 cm after which the tree is felled by tractor or winch. If case of multiple lodged trees their removal should be done by tractor and by above mentioned methods, each tree is removed separately. For example: the tree which is situated on top will be removed first.

In case of removing lodged trees it is necessary to use kilbig with curved and pointed ends so that it will not slip on the tree during the felling.

Blow down tree twisted tree root with lying on the ground is sawed in the following way:

- if a tree felled with the roots, lying on the ground and has a bending in order to avoid tipping of the root block to its original position strengthen

it with special rest and only then saw a tree trunk. Sawing of the trunk is made by two cuts on top and on basis. The first cut is made from the top to a depth of 1/2 diameter and the second cut is made from the bottom at a distance of 2–3 cm from the plane of the first cut (near the basis). After separation from the trunk, root system is placed in its original position as a clump by winch or tractor or uprooted;

– it is particularly necessary to strengthen root system of a fallen tree with an external bending as well as to saw the trunk by two cuts. All these action are above mentioned;

– when a fallen tree is firmly fixed to the ground a hole is dug under the trunk for a easy way of petrol saw guide bar then saw the root system.

The trunk of uncut breakings is sawn at a high of 1 m with putting pads under the trunk. Sometimes it is necessary to fix the tree to the stumps or by rope before felling to prevent the release of the stem wood. In all cases feller should stand on the opposite side of possible trunk turn.

The following things are not allowed during the developing of blowdown windbreak cutting areas: chop the branches of the trees on which they are based; to step on the felled trees; be in the pit with twisted root blocks; hem roots of everted tree.

**Conclusion.** Accident prevention for manual felling of trees is possible only in case of masters and workers' responsible attitude towards their duties as well as strict adherence to technological manual.

### References

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