CHARACTERISTIC OF FOREST PROTECTION BELTS

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Abstract

Over the last century, 9 state forest belts and a comprehensive network of forest protection belts were created in northern Bulgaria. These are facilities to combat wind erosion of the soil. For the purposes of the Forestry Act, they are a forest with a protective production function, which is public state property.

It is very important to create forest protection belts in areas with prolonged summer droughts. Their primary purpose is to reduce the wind power to improve the microclimate of the area and to protect neighboring agricultural lands from their destructive power. This in turn reduces the evaporation of water from the soil and its more efficient use by agricultural crops and the increase in yields. The protective function of the forest protection belts increases crop yields by 30%. The present publication presents the approaches to creation, overall management as well as management of the forest protection belts.

Keywords: *management, protective function, forest protection belts*

The first field protection belts created in Bulgaria were in 1936-1939 year near village Kurvuna (municipality Balchik) and the village of Rogozino (Dobrich municipality). They were predominantly acacia and mixed ¬ acacia and grasshoppers with shrubs, ash and small lichens with shrubs.

After the publication of Decree of the Council of Ministers №236 / 08.03.1951 for 10 years in Dobrudja has built a system of state protection forest belts and forest protection belts (FPB). State forest protection belts are established mainly in dry soil with anti-erosion target, to reduce water erosion. The goal of the FPB is to improve the microclimatic conditions in neighboring agricultural lands by reducing the prevailing wind power. This influences favorably the water regime of the soil by reducing the non-productive evaporation of water from the soil and the vegetation, contributes to the correct distribution of the snow cover over the entire area of the agricultural lands and reduces the destructive activity of the wind erosion. All this leads to an increase in yields from agricultural crops.

By decision No 25 / 25.12.1977 of the Ministry of Agriculture and Forestry the SGP was included in the State Forestry Fund and in 1980 the first forestry projects were prepared.

The object of this publication is the state of the forest protection belts in the area of General Toshevo State Forestry Enterprise.

The division of forests in Bulgaria has done in the fifties of the last century, when two groups of forests - with economic and special functions - were identified. The group of special purpose forests includes: protective and recreational forests, green zones, reserves, state forest protection belts and the creation of forest crops in the deforested territories. The approach that is being adopted at this time is the ecological one, which is basically the elaboration of many projects: to combat erosion in the forest fund, water catchment areas, forest parks and green areas. And while the effect of the implementation of anti-erosion projects is undeniable, the scarcity of funds and a particular financial interest are the basis for the unsatisfactory condition of these facilities.

In the period 1995-2005 the total area of the group "Protective and recreational forests and forests in protected areas" decreased by 67 674 ha. The reason for this is the return of the owners of agricultural lands and forests, which in turn leads to improper management and management of this system and even its felling. [9,10,11,12,14,15,16,17,18]

Global deforestation is a major factor in disrupting ecological balance in nature. Reducing forests leads to a number of unfavorable factors, such as drought and wind gain, snow cover, dry water, soil and plants causing deflation and dust storms, etc. Air, soil, water and the biosphere is polluted, damaged and destroyed.

Fields - types and schemes of creation

In order to perform their function, the forest protection belts must have a certain construction - height and width. The height depends on the main, contiguous and shrub species used. The width is determined at their creation and it is between 16 -18 m.

The pores are classified according to their structure of flashes, openings, openings and non-blowing.

Removable - belly-cleaved stalks without shrubs - omit about 35% of the airflow. It features a high density in the top and middle of the side profile and bottom of the larger holes. Area gaps between the trunks of more than 60%, in crowns - 15%. The width of the forest strips of 10 - 15 meters; imposing two-tier, without undercut or low shrubs. The bulk of the airflow passes through the lower part of the strip and the remaining streams around it;

Scatter-scrubbing - Belly-cleaved stalks and the presence of low shrubs - omit about 25-35% of the air flow;

Layers - branches with branch-cleared stalks and the presence of tall shrubs and podles - omit about 15-25% of the air flow. It is characterized by the uniform placement of lumens (different sizes) on the side of the forest belt. Shape of the area is 25-30% of the forest wall. The width of these strips 15 to 20 m; Plantation complex. The main part of the air flow passes through such a wall and the other streams around it; [9,10,11,12,14,15,16,17,18]

Unexploded - highly branched crowns, thickened with shrubs and contiguous species, leak up to 15% of the airflow. Windproof (dense) structure.

The main schemes for the creation of the protection belts are limited to several types:

• Belt with main shape (see drawings 1 and 2)

- 13 rows, with the distance between the rows being 1.25 m, and between the saplings 0.7 m. The distance between the plots is 5 m (Scheme 1);
- the distance between the rows is 1.5 m, and between the saplings 0.7 m, the main species is imported in three rows without any companions and bushes between the saplings of the main species. (Scheme 2)

• Belt with main oak (see drawings 3a and 3b)

- The distance between the rows is 1.5 m, and between the saplings 0.7 m. The main species is imported in five rows, with no companions and bushes between the saplings in the row (Diagram 3a);
- the distance between the rows is 1.5 m, and between the saplings 0.7 m, the main species is imported in three rows, without the companions and bushes between the oak saplings in the row (Diagram № 3b)

• Belt with a major type of Polish or plain ash (see Figures 4a and 4b)

- clear is imported in five rows as accompanying species missing (Scheme 4a);
- clear in three rows and the accompanying species is walnut (Diagram 4b)

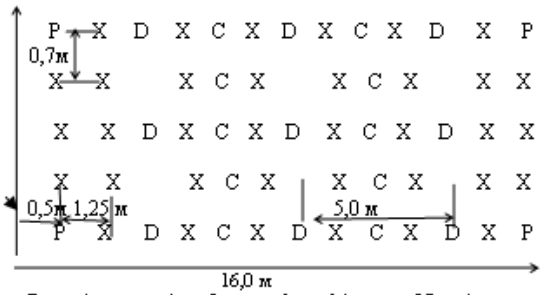
• Belt with a distinct look or clear look (see Diagrams 5a, 5b and 5c)

- the main species - the glade is imported in three rows, with a sapling between the saplings, the distance between the rows is 1.5 m (Schemes № 5a);

- the main species - glade is imported in five rows, with the saplings between the saplings, the distance between the rows is 1.5 m (Schemes № 5b);

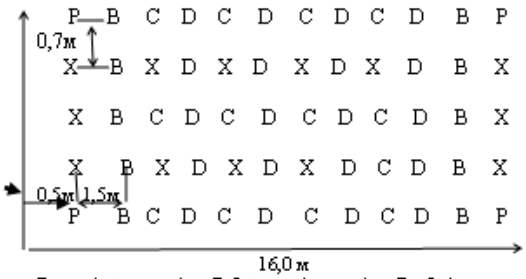
General Toshevo State Forestry Enterprise

Schemes № 1



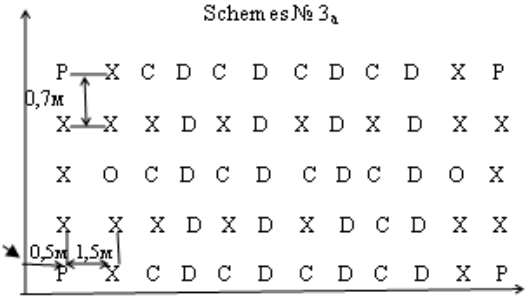
D – main tree species – Quercus , located in nests of five pieces ;
C – accompanying species; P – fruit ; X- shrub

Schemes № 2



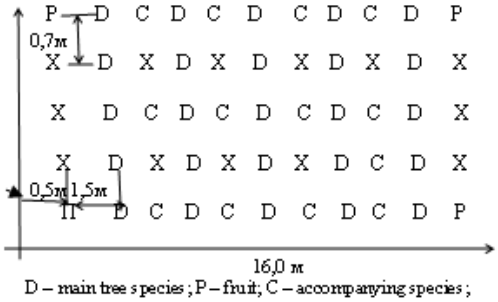
D – main tree species ; B-fast growing species ; P – fruit ;
C – accompanying species; X – shrub .

Schemes № 3а



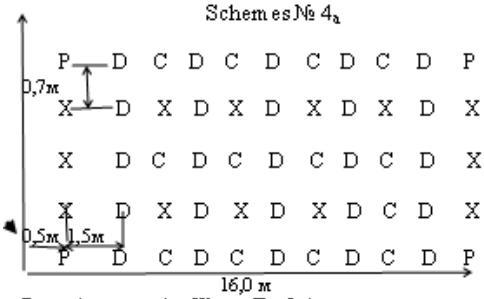
D – тилия дървесен вид; O – Juglans ; P – fruit;
C – accompanying species; X – shrub

Schemes № 3б



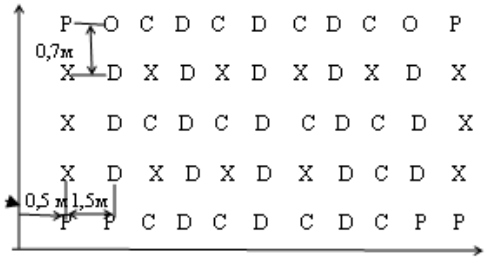
D – main tree species ; P – fruit; C – accompanying species ;
X – shrub .

Schemes № 4а



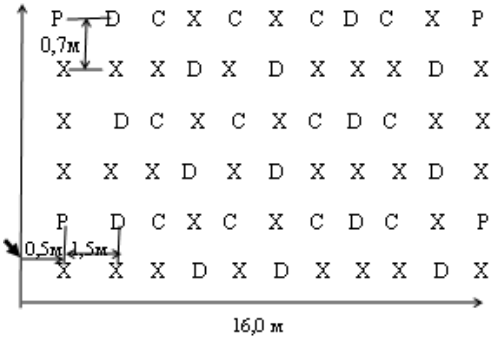
D – main tree species- Ulmus ; II – fruit;
C – accompanying species; X – shrub .

Schemes № 4б



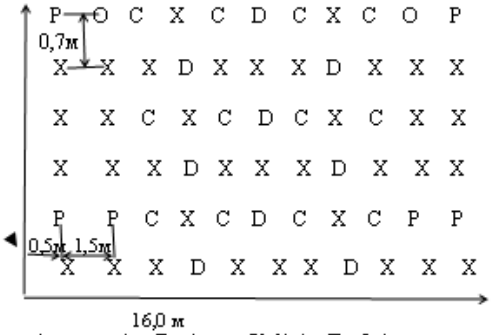
D – main tree species- Ulmus ; II – fruit; O – Juglans ;
C – accompanying species; X – shrub .

Schemes № 5а



D – main tree species – Fraxinus or Gleditsia ; II – fruit;
C – accompanying species; X – shrub .

Schemes № 5б



D – main tree species – Fraxinus or Gleditsia ; II – fruit;
O – Juglans ; C – accompanying species; X – shrub .

the main species is presented in nine rows, four of them, the distance between the rows is 2 m, and between the saplings is 1 m. (Schemes № 5c) [6,9,10,11,12,14,15,16,17,18]

According to Georgiev, in spite of the tested methods (saplings or planting of acorns) during the creation of the forest protection belts and the incurred costs, it has been established that all the production costs for the creation of the belts, including the depreciation allowances for the entire period of preparation of the soil for planting till now of the planting density per hectare is "the most advantageous are the bands that are planted on the double-row group and row-nest method with simultaneous introduction of concomitant and fast-growing species. . "In the creation of oak veneer belts, income from crop growing is obtained. From corn for 2-3 years, an average income of 1 dka is obtained, which covers the costs of reating the belts [1].

Forestry systems in forest protection belts

According to Ordinance № 4 of 19.02.2013 of the Ministry of Agriculture, Food and Forests for protection of forest areas against erosion and ruins and construction of fortification facilities, the planning and implementation of the protection, the types of facilities and activities for protection, the design of anti-erosion activities and fortification structures, the construction, maintenance and acceptance of fortification facilities, the requirements for the creation of protective forest belts and the protection against landslides in forest areas.[5] Planning of forestry activities for the creation, formation, breeding, re-use and use of forest protection belts is based on the principle of sustainable development, environmentally sound use and multifunctional management. Depending on the logging system, the order and the way of felling the trees or trees is determined for a certain period of time. When planning and conducting all the events that are underlying, it is necessary to strictly observe the conditions in order to prevent, reduce and eliminate as far as possible the presumed negative impacts. For the 10-year period, according to the condition and the origin of the plantations, the necessary fellings were carried out. The main fellings that are held are tinning and principal cuttings. The main cuttings are naked and short-term-gradual felling. The way of felling trees or trees on a certain area over a certain period of time determines the logging system, which preserves and increases the protective and other useful functions of the forest. The naked logging takes place in a redundant reconstruction and rebuilding. The short-term logging is carried out in the oak girders with good conditions for natural regeneration. This felling takes place in two phases. The final phase is over 75% of the area is resumed and the undergrowth is 80-100 cm. The clear cutters are designed to create a driftwood structure for more even distribution of the snow cover and reduce wind erosion. In the forest forest belts, tinning. The tinning is carried out until the woods are sloping depending on the basic tree species. In the trusses that are made of acorn, one or two trees are left in a nest, with the companion being laid in the third year. In the acacia made from shoots, leave the root shoots - 3-4 by removing the buds. The end rows are scraped off and branches of 3.0 cm in diameter and 1/2 in height from the stem are removed. The cuttings are carried out by the saplings of trees up to 20 years of age. Entering the selection is the rows of the main look. Removes up to 20% of the stock, the density should not fall below 0.8. The combinations are used with strings of the string method. Remove the bushes and regulate the participation of the satellite. 1-2 crashes are done in the final rows. At the age of 6-9 in the acacia belts one line is made by subtracting up to 30% of the stock and the second in 10-12 years, the density being up to 0.7. The orders are from 21 to 40 years. In the belts with a basic look - a tree created by a nesting method, the number of trees is adjusted, it is deducted up to 20% of the stock and density up to 0.7. Remove shrubs and tree species, regulate the participation of the satellite. Lung belts reduce participation. Trim the end rows at a height of 4-5 m. The drills are mainly in the oak girders and end up 10 years before the start of the main felling. The intensity of the felling is up to 20% of the stock and the density is up to 0.7. The shrubs and the samanastanite tree species are removed by providing a fluff-blowing structure. [8,9,10,11,12,14,15,16,17,18]

Fields of forest protection show a different growth depending on their species specificity and the type of mixing. This leads to management problems due to the different sanitary status of the species in the same belt, which necessitates specific solutions for the different composition of the belts. In the initially used PGI schemes, the participation of bush and contiguous species is large, which leads to the formation

of belts with non-flammable construction. In order to assess the status of the GFC, the selection of tree species, afforestation schemes, main, contiguous and shrub species and their ratio, health status, etc. are analyzed.[2,9,10,11,12,14,15,16,17,18]

State of the forest protection belts on the territory of General Toshevo State Forestry Enterprise According to the Forestry Act, according to Art. 4 the forest areas are divided according to the main function of forests: with protective, special and economic functions. According to the GW, the forest protection belts are protective forests. At this point, the total area of the forest protection belts in the General Toshevo area is 2892.4 ha, out of which 2841.7 ha is afforested and 50.7 ha non-free. The stock is 228235 m^3.[6]

On the territory of General Toshevo State Forestry Enterprise, the plantations of natural origin occupy 32.4% of the total area. The unprocessed wood-producing area covers 0.9%, and these are naked. The non-productive area occupies 0.8%, the largest area occupying the slopes - 0.5%. Of the function performed by the forests in this area are divided into protective forests 2668.5 ha or 93.9%, protected forests 5.9% or 166.3 ha and economic 0.2% - 6.9 ha.[6]

Fields of forest protection are located in a network consisting of main and secondary elements. The main ones are located in a direction perpendicular to the prevailing northwest winds and the secondary winds in the direction of the winds. In this way are created fields with a length of 1000-1500 m and a width of 400-500 meters. In the area of General Toshevo, the main areas occupy an area of 1950.3 ha and the secondary ones - 942.1 ha.[6]

The distribution of wooded area up to 20 years is 912.3 ha, from 21-40 years is 198 ha and from 41-60 years is 1732 ha. The main plantation with the largest area is with trees between 41-60 years of age. The stock of the main plant of the three classes is: from 1-20 years - 36215 m3, from 21-40 years is 15220 m3 and 41-60 years is 1768000 m3. Therefore, the largest stock is in the plantations of 41-60 years, which is 70% of the plantations.[6]

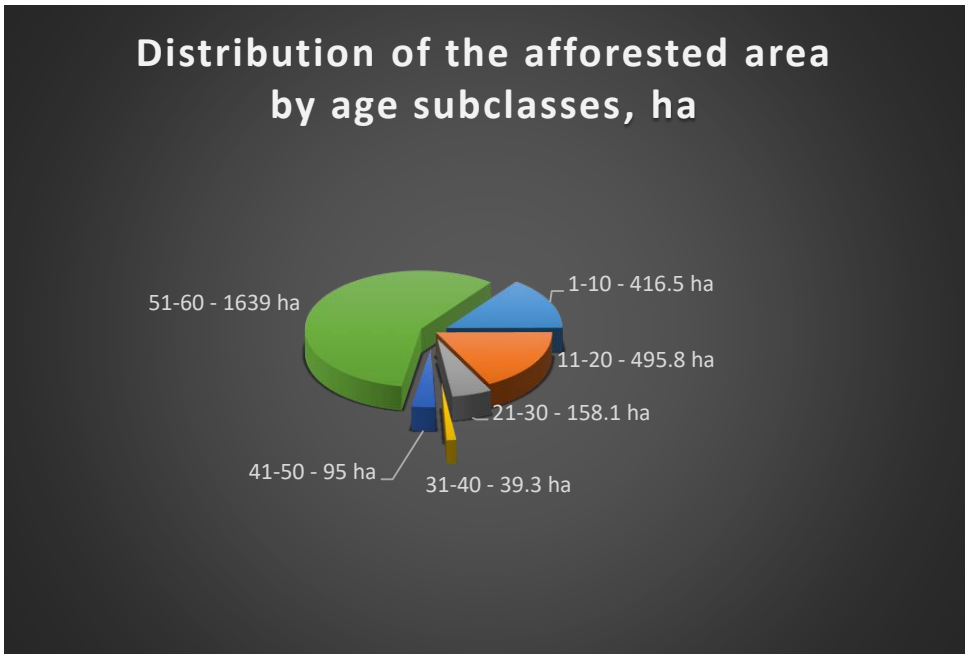


Fig. 1. Distribution of the afforested area by age subclasses, general protection belts in General Toshevo State Forestry Enterprise, ha

Source: Forest management project General Toshevo State Forestry Enterprise

The most sustainable species are Quercus cerris L., Quercus pubescens Wild and others. They are in clean or mixed plantations with their typical companions and shrubs. Among the adjacent ones are: Robinia pseudoacacia, Ulmus pumila, Fraxinus america L., Fraxinus A., and Tilia agrentea and Lesser lime Tilia cordata), Field maple (Acer campestre), Acer tataricum, Fraxinus ornus, Elaeagnus angustifolia, and others.

Appropriate forest species: Juglans regia, Aesculus, Malus sylvestris, Pyrus pyraster, Prunus cerasifera, Morus alba. From shrubs (Cotinus coggydria), Common Cornus mas, Cornus sanguinea, Common Corylus avellana, Sambucus nigra. The main belts are located about 500 m apart and the average area of the protected areas is between 500 and 2000 decares. The strips of oak, ash, acacia and other species were created 55 years and over.

At this stage, the largest spread is the oak - 24.3% of the forested area and 24.6% of the wood-producing area, the acacia and the viewers, which have an approximately equal percentage of participation - 20.2% and 20.0% of the afforested, and 19.7% and 20.0% of the wood-producing area.

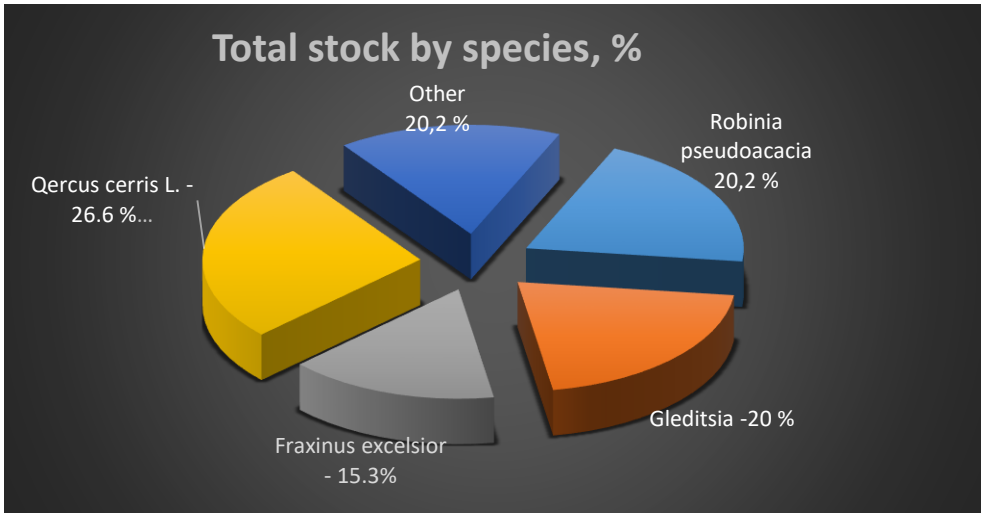


Fig. 2. Total stock by species composition forest protection belts in General Toshevo State Forestry Enterprise, %

Source: Forest management project General Toshevo State Forestry Enterprise

In the current forestry plan, the area of the forest protection zones is set to be maintained - 2841.7 ha, with an increase of 27% of the wooded area and 26.6% of the wood-producing area, the acacia and the gates which are approximately equal percentage of participation - 20,2% and 20,0% of the afforested area, and 19,7% and 20,0% of the wood-producing area. Besides, in the appropriate future composition, the oak (2.9%), the red oak (1.1%), the mountain ash (16.5%), the silver-linden (0.3 %).

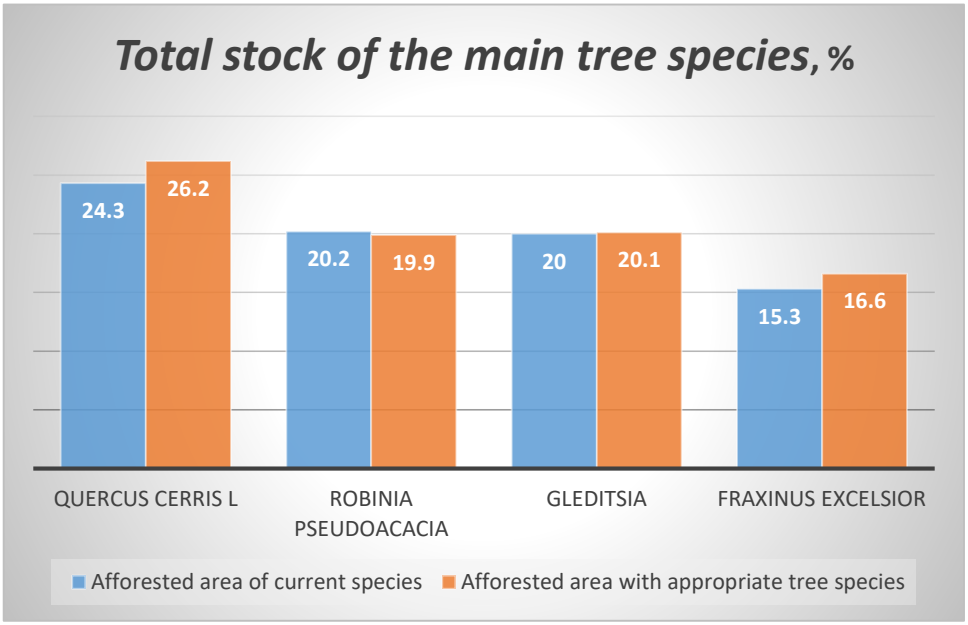


Fig. 3. Total stock of the main tree species in the forest protection belts in General Toshevo State Forestry Enterprise, ha

Source: Forest management project General Toshevo State Forestry Enterprise

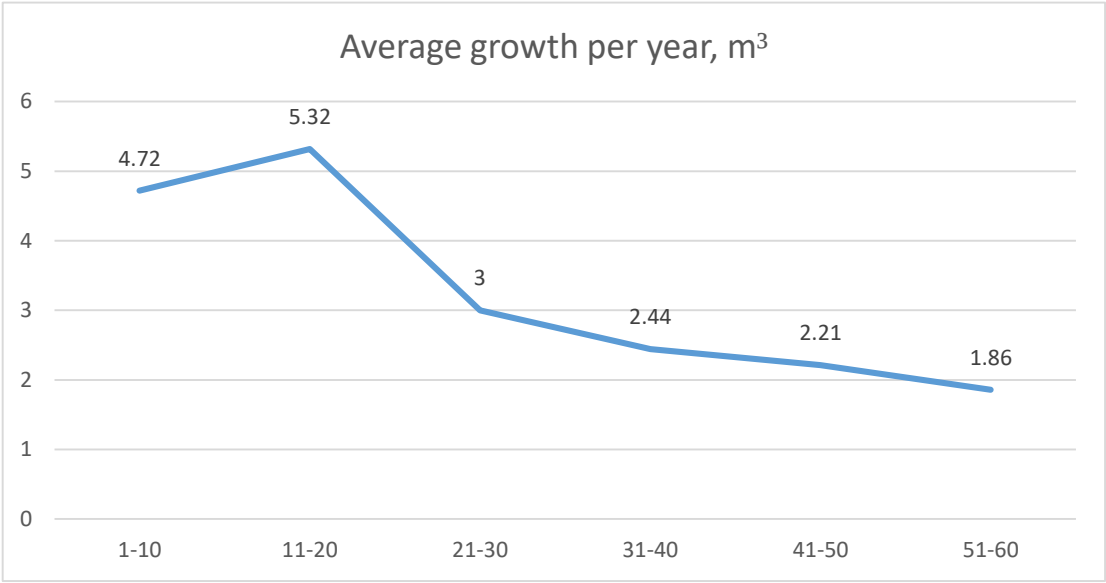


Fig. 4. Distribution of the average annual growth by age subclasses, in forest protection belts in General Toshevo State Forestry Enterprise, m^3/ year.

Source: Forest management project General Toshevo State Forestry Enterprise

The chart shows the fastest growth between 11-20 years, gradually decreasing. A plot for reconstruction on the territory of General Toshevo was carried out on an area of 43.4 ha and a yield mass of 6321 m3 / 10 years. For the period up to 2015, according to the condition and the origin of the plantations, the necessary fellings were carried out. The reforestation that has been carried out is barely reclaiming and is mainly applied to mature acacia and glade plants. The harvested timber is 13 767 m3 / 10 years. With the clearing, the resistance of the plantation is increased and the production maturity of the technical

mature wood is shortened, the production of wood is 18 103 m3. They carry four types of cutting - luminescence, grinding, cutting and drilling. The cuttings were cut on an area of 27.3 ha. The discharges were carried out on an area of 44,4 ha and yield of 212 m3 / 10 years, such as 0,48 m3 / ha The dismantling was done on an area of 464,7 ha and the harvested wood was 11,900 m3 / 10 years, with 2,56 m3 / ha. The sampling was carried out on an area of 234.8 ha, with a density of 0.8-1.0 and a yield of 5991 m3 / 10 years, such as 2.55 m3 / ha.

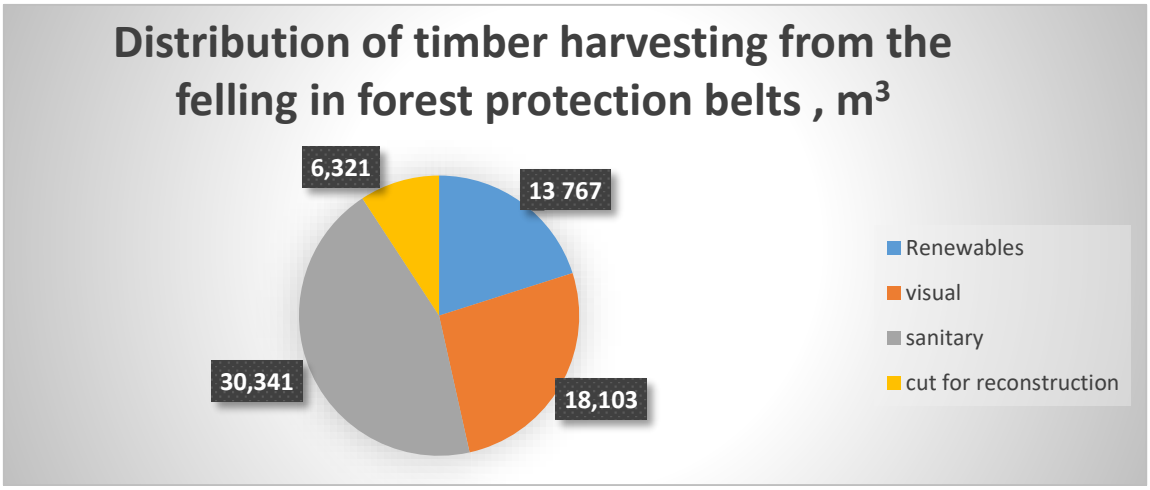


Fig. 5. Distribution of timber harvesting from the felling in forest protection belts in General Toshevo State Forestry Enterprise, m^3

Source: Forest management project General Toshevo State Forestry Enterprise (2015)

From the Forest Management Plan on the territory of General Toshevo State Forestry Enterprise, the state of the GGP is defined in three groups:

Good - this is a situation where the pattern from the creation of the belt to the moment of observation is undamaged, there are no signs of health problems (lack of sucessing, defoliation to 25%, crown and stem coloration - up to 25%, no frostbite, cancerous formations etc.) and the permeability is good - over 65%. Under these conditions it is assumed that the belt is complete and performs its functions.

Satisfactory - this is the condition where the main species has a composition of more than 50%, the state of health is satisfactory (defoliation to 60%, crown and stem coloring - up to 60%, down to 30% and single trees affected by frostbite or cancers) and the girdle has an unproducible, 35-65% compacted structure. Under these conditions it is assumed that the belt has a partially impaired functionality.

Poor - this is the condition that arose as a result of the aging of the forest tree that passed through the fire belt, illegal felling and other biotic, abiotic, and anthropogenic impacts; the main species is missing or its participation is less than 50% of the composition; the health condition is poor (defoliation above 60%, crown and stem coloring - over 60%, over 30% decay with signs of decay, the majority of trees are affected by frostbite and cancers) and the girdle has a completely impaired flotation, which is below 35%. Under these conditions it is assumed that the girdle does not fulfill its purpose. [6]

In order to improve their condition and increase their efficiency, it is necessary to respect the economic measures and concrete management decisions for each belt:

- The plots, which are in a satisfactory condition to carry out the necessary felling, with which to create the necessary construction, being cleansed by the end branches and shrubs. Restore the main view in the appropriate ratio of the creation scheme. Gradual felling of diseased trees.
- Those who are in good condition may have only the sanitary cuttings and cuttings where necessary to maintain the fired structure.

- Those in poor condition can be restored by natural regeneration where this also allows for new belts.[6,7,8]

Conclusions and recommendations

In order to fulfill their protective function, the forest protection belts depended on the appropriateness, the parameters, the qualities and the maintenance of the plantations and the systems they form bythemselfs. These benefits from the forest protection belts combine to protect the soil from degradation, incl. erosion, desertification, etc., preservation and improvement of soil fertility, increase in crop yield and quality, protection of water, soil, air and human health, etc., increasing biodiversity in the environment.

This main role of the forest protection belts for mitigating the risk factors in the production of agricultural products is reduced to the detrimental effect of the winds, which in turn leads to a more uniform snowing, longer snow retention and to the increase of soil moisture. The temperature and humidity of the air increase.

Depending on the construction and the width of the belts, the snow is deposited most evenly behind the belts with a permeable structure. A well-pronounced snow-retention effect is found in girders with a height of more than 7 m, and in the case of fogging it extends 30 times their height, and in the case of non-blowing - 20 times the height of the girdle. Dense and unproducible forest protection belts gather a lot of snow in the plant itself and around it, and in large springs, which can cause snowshoe trees.

From an economic point of view, forest protection belts havw two sides. First is that they are ecosystems and the second is that they produce ecosystem benefits which are direct and indirect. In this case, the direct benefits are from the extraction of wood products. But the most important is the indirect, which is realized by the increase of the yields of the agricultural products.The proper creation, management and use of forest protection belts is a prerequisite for sustainable management of multifunctional forest management, which leads to an increasing economic impact on ever larger areas of the protected area.

Acknowledgement

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