Natural regeneration of common ash *Fraxinus excelsior* L. stands in Latvia

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FRAXBACK meeting

Dubrovnik, 2015

The aim of the present research was to evaluate natural regeneration and vitality of new ash advance regeneration.

Objectives:

- to determine the current ash stand composition;
- to establish the current ash advance regeneration and undergrowth composition;
- to establish ash regeneration density and factors affecting it;
- to measure degree of ash damage by *Hymenoscyphus fraxineus*.

H. fraxineus

- One third part of the ash forest stands in Latvian are dead – at present, European ash comprises only 0.5% of total forest area.

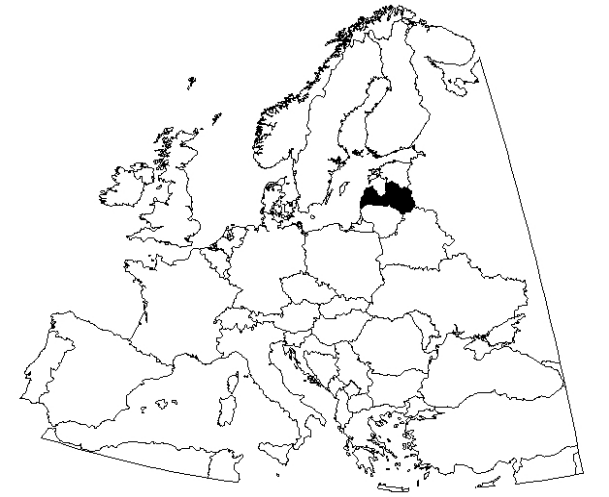


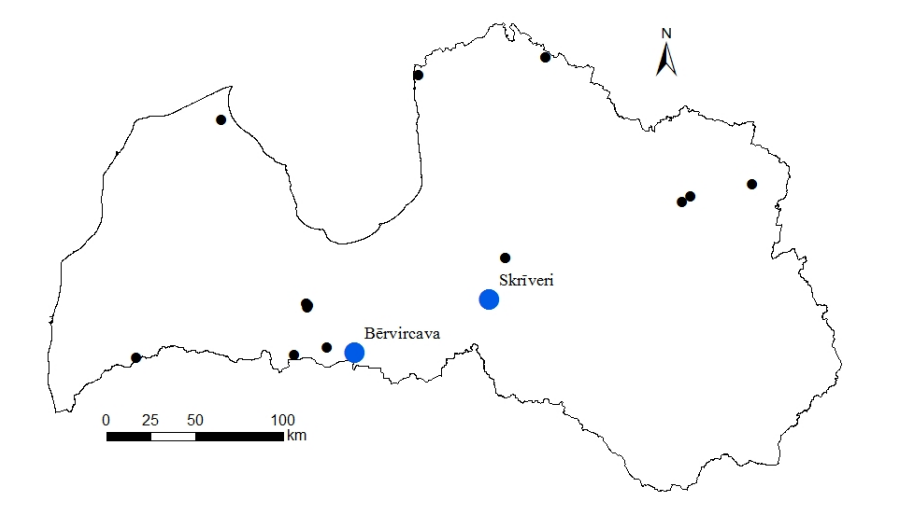
- There are still some areas where ash is sufficient one canopy, and quite much advance regeneration below 10 years age is formed.

Materials and Methods

170 plots:

- different regions in entire Latvia;
- the majority of studied plots were established in Skrīveri and Bērvircava.





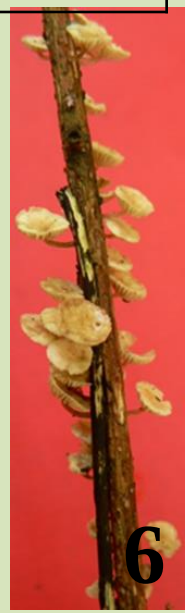
There were ash stands of different age, with ash being the principal species with ather species admixture, or admixture species for other tree species.

Materials and Methods

- 20×20 m plot :
  - for the first (E3) and second (E2) layer projective cover of each species.
- 25×1 m transect:
  - for counting and measure height of ash advance regeneration;
  - for counting and measure height of all advance regeneration and undergrowth species;
  - for determining degree of ash damage by *H. fraxineus*.

Classes of ash damage

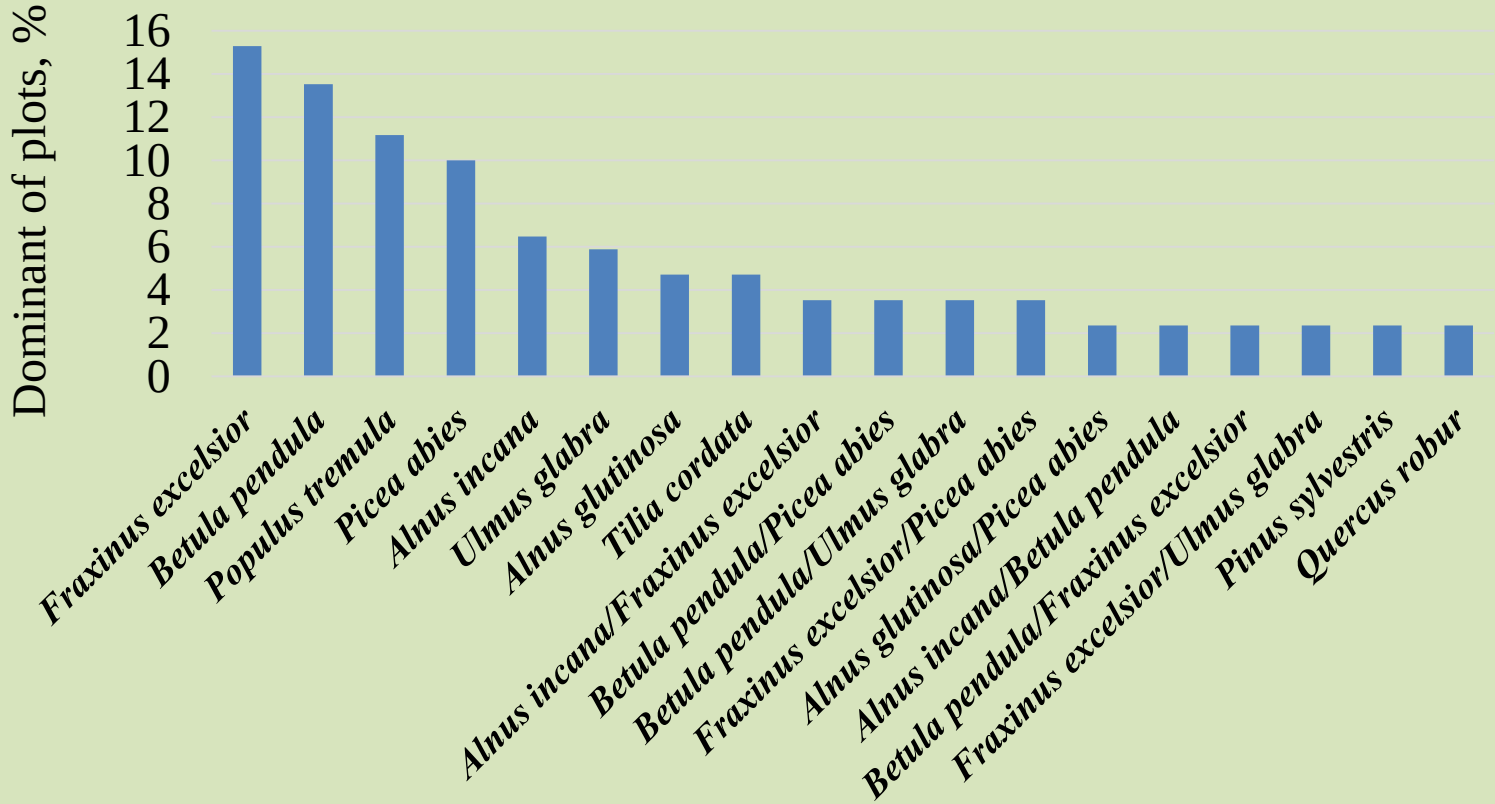
Class	Degree of ash damage (%)	Visual characteristics
1	0-10	Tree looks healthy or slightly damaged individual leaves.
2	11-25	Damaged several pages, some necrosis of the bark.
3	26-60	Fully damaged / dead separate branch; damaged part of the foliage; necrosis of the bark on large areas.
4	61-99	Completely broken up dead part of the crown; partially damaged the entire crown; live separately branches in secondary crown.
5	100	Tree completely dead.



Results

Canopy layer

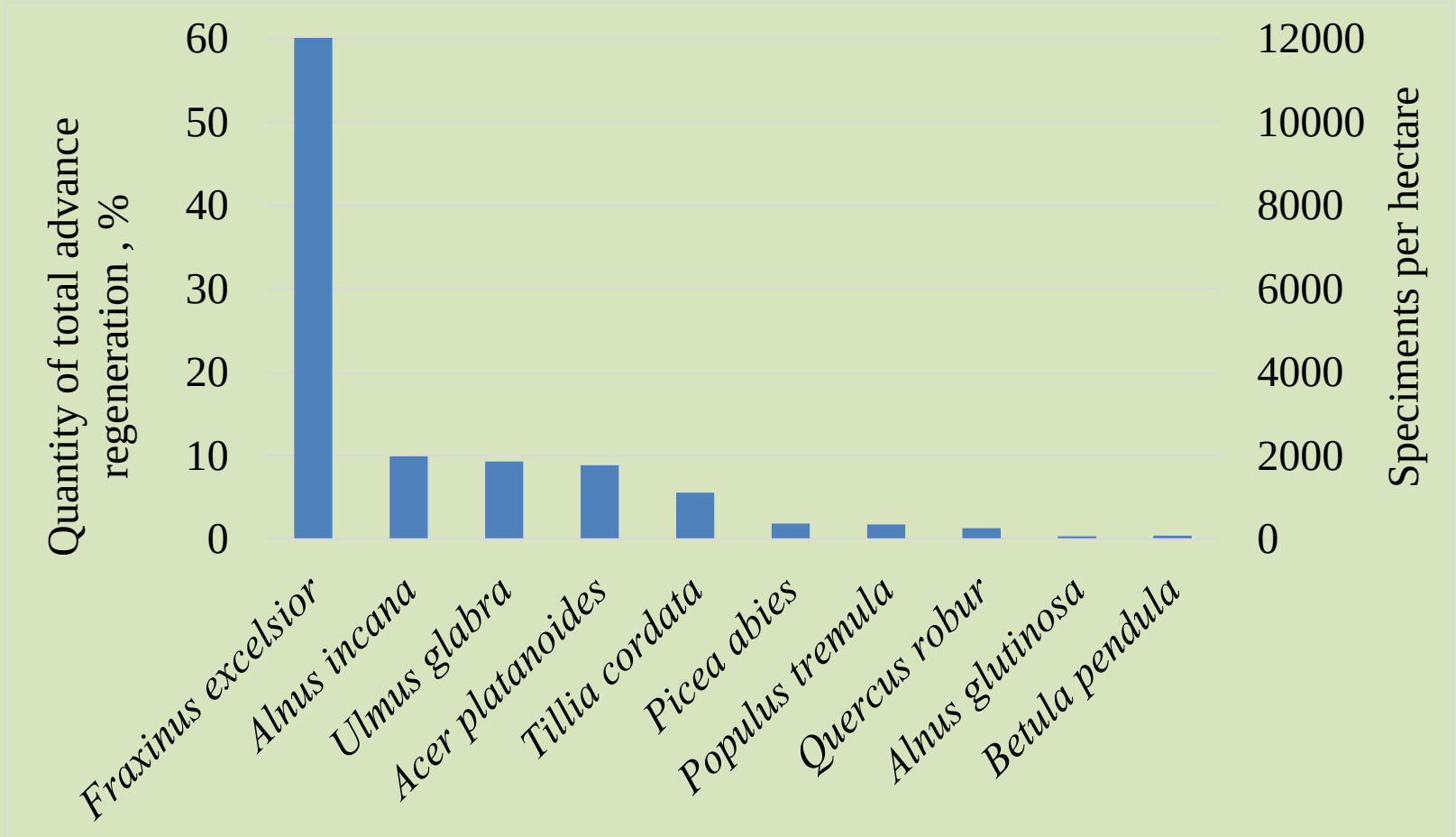
- Ash trees were found in admixture.
- In some stands ash had not survived in the layer E3.
- Average ash cover in layer E3 - 10.2%, in layer E2 - 4.2%.
- The E3 layer was dominated by ash, birch, aspen and spruce.



Results

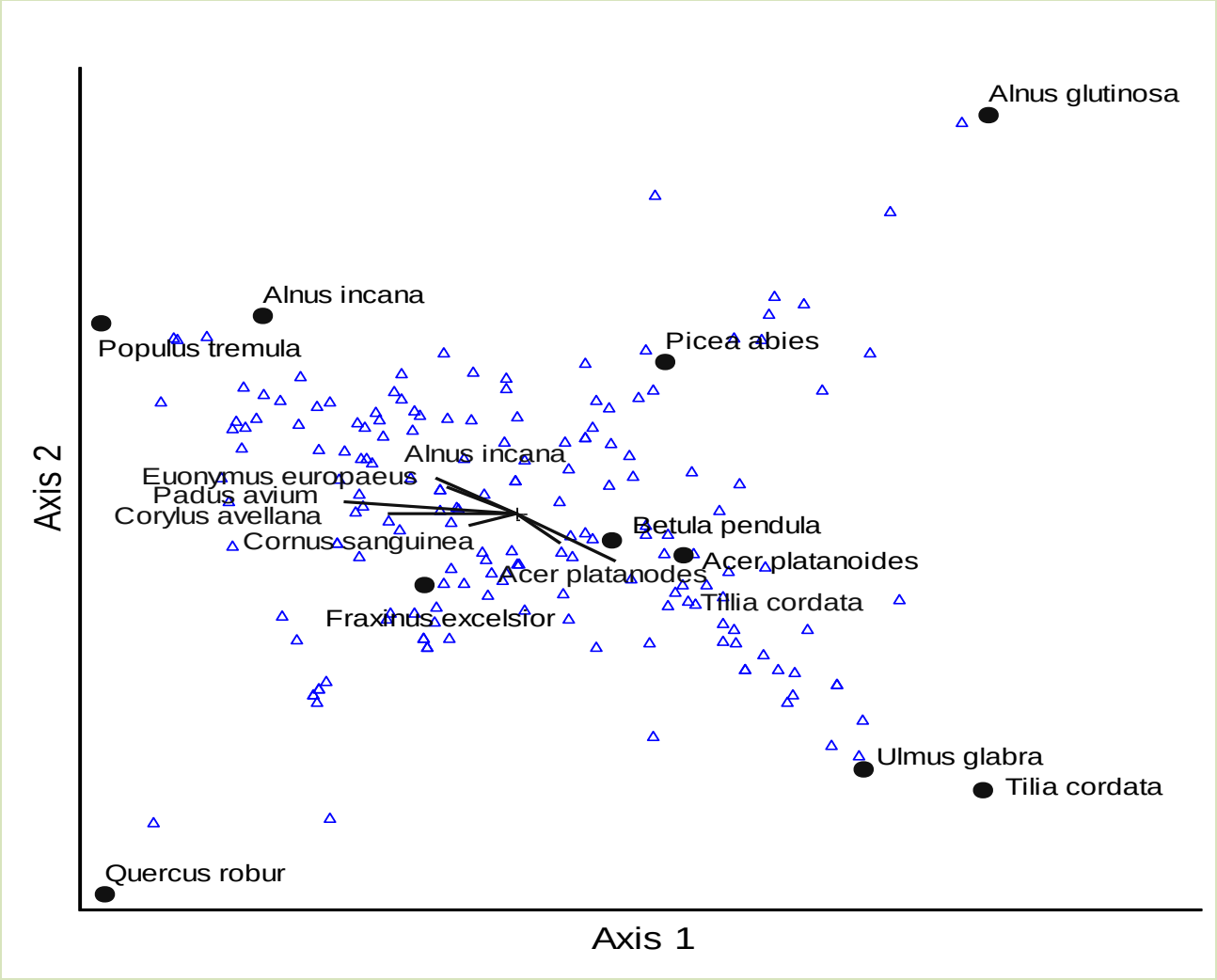
Advance regeneration composition

- Ash was the dominant tree species – it comprised 60.5% of the total number of species, density - 10 473 trees ha^{-1}.
- The following three species - grey alder, elm and Norway maple.



Results
Advance regeneration

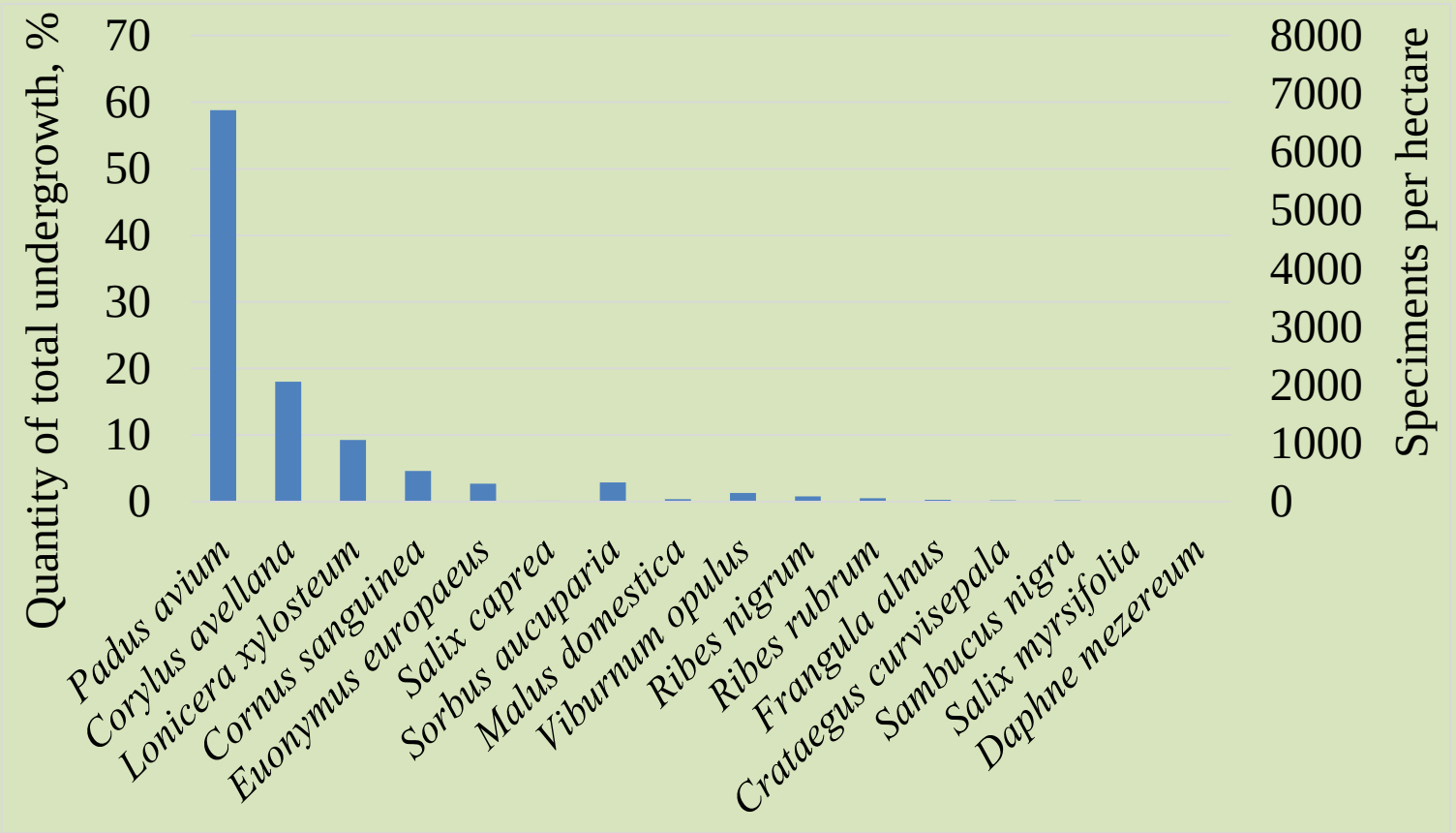
- The same species regenerate that dominate layer E3.
- In stands where ash was dominant different undergrowth species regenerate: bird cherry, hazel and common dogwood.



Results

Undergrowth species composition

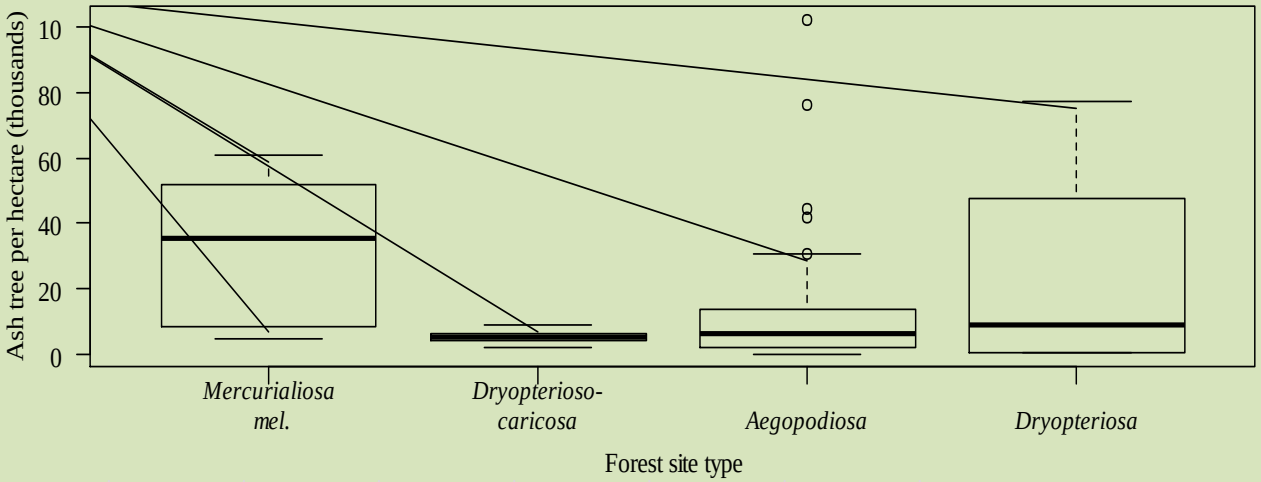
- Bird cherry (58.8%, 7 042 tr ha $^{-1}$), hazel and fly honeysuckle was dominant.
- A weak statistically significant (p = 0.05) correlation was found between shrub layer cover and new ash trees density.

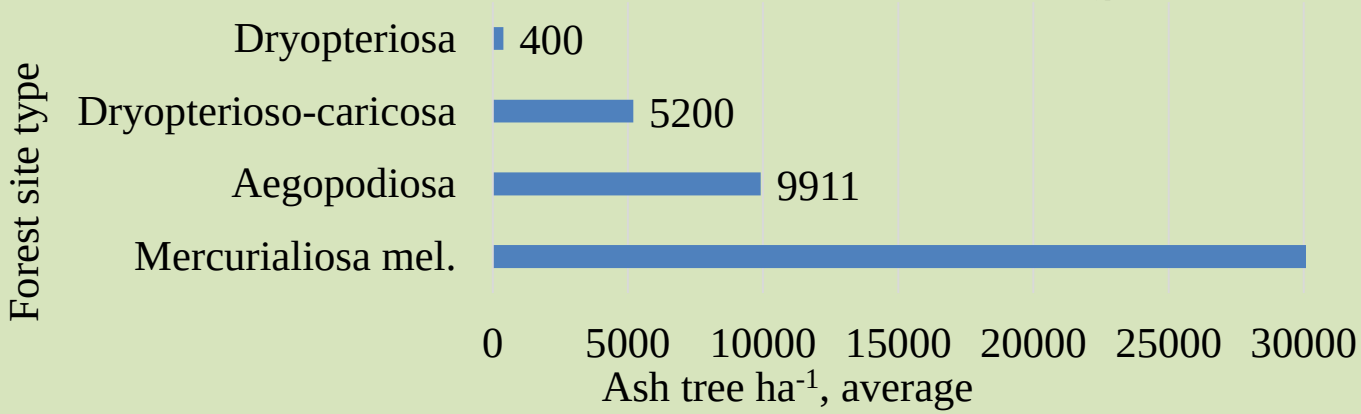


Results

Ash regeneration

Analysis of variance indicated that ash regeneration density is significantly influenced by the dominant species in layer E3 ($p = 0.03$) and forest type ($p = 0.03$).

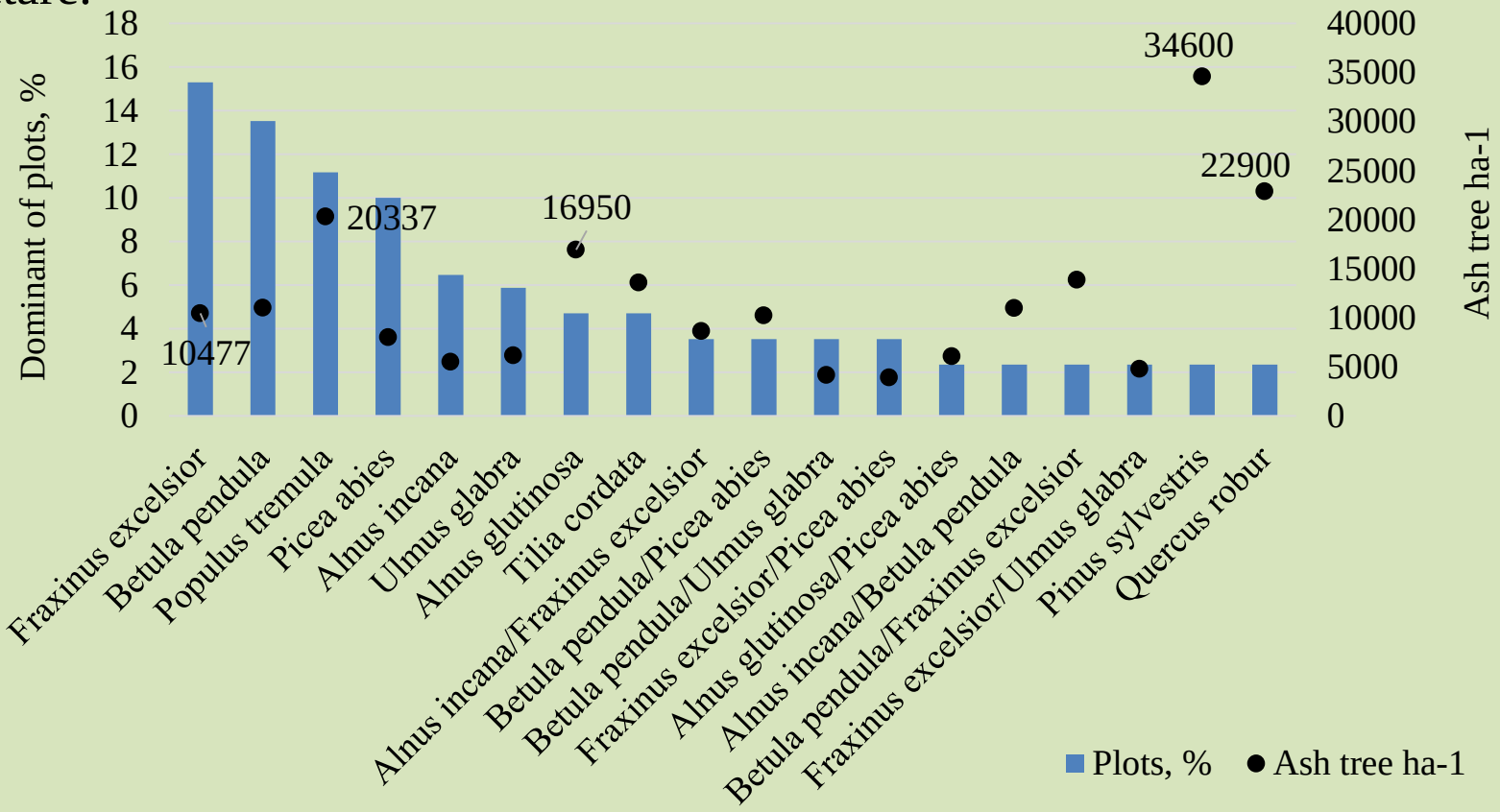




Results

Ash regeneration

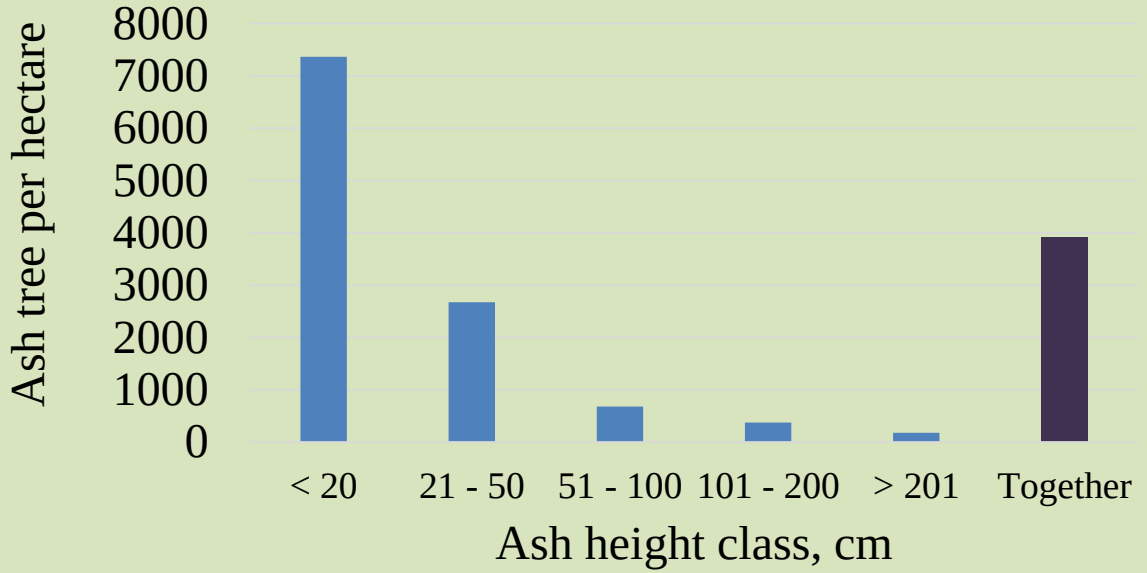
- In average the greatest number of ash specimens was found in eutrophic pine stands, then in oak and aspen stands.
- In ash dominated stands - 10 477 ash per hectare.
- In stands where ash was admixture species - no more than 8 700 ash per hectare.



Results

Ash regeneration

- The largest density was found in ash saplings in height below 20 cm.

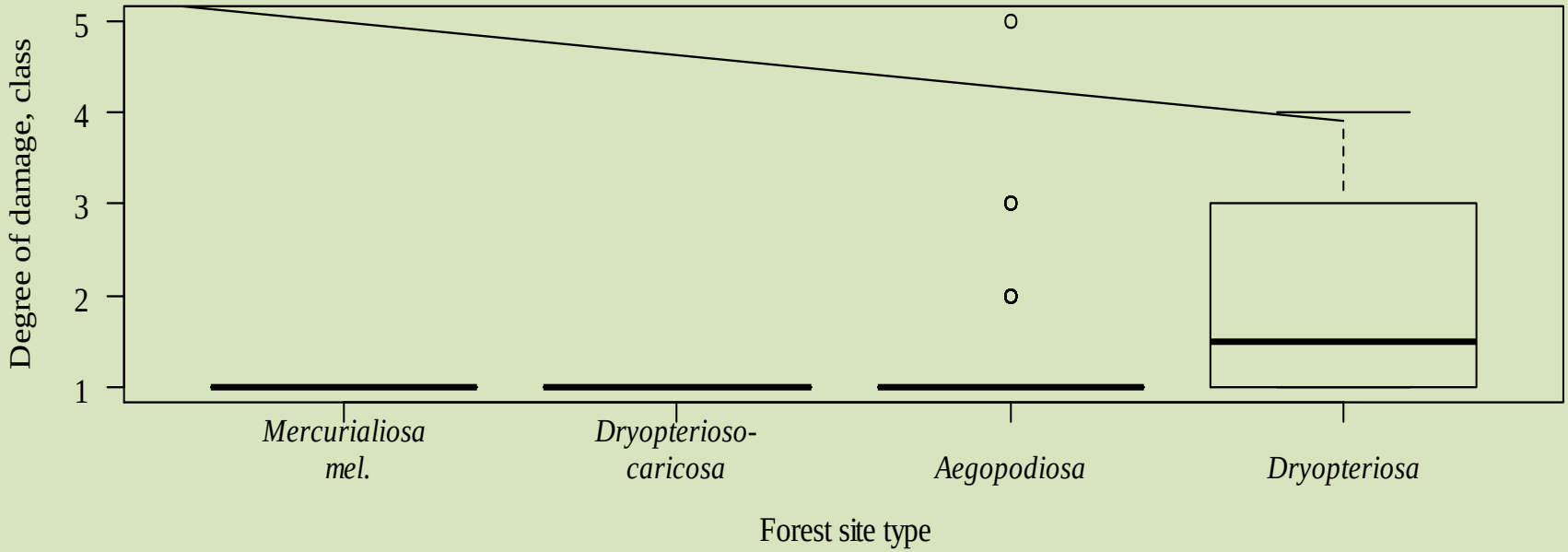


- Ash regeneration density had a statistically significant correlation with a number of woody plants listed in advance regeneration.

Results

Degree of *H. fraxineus* damage

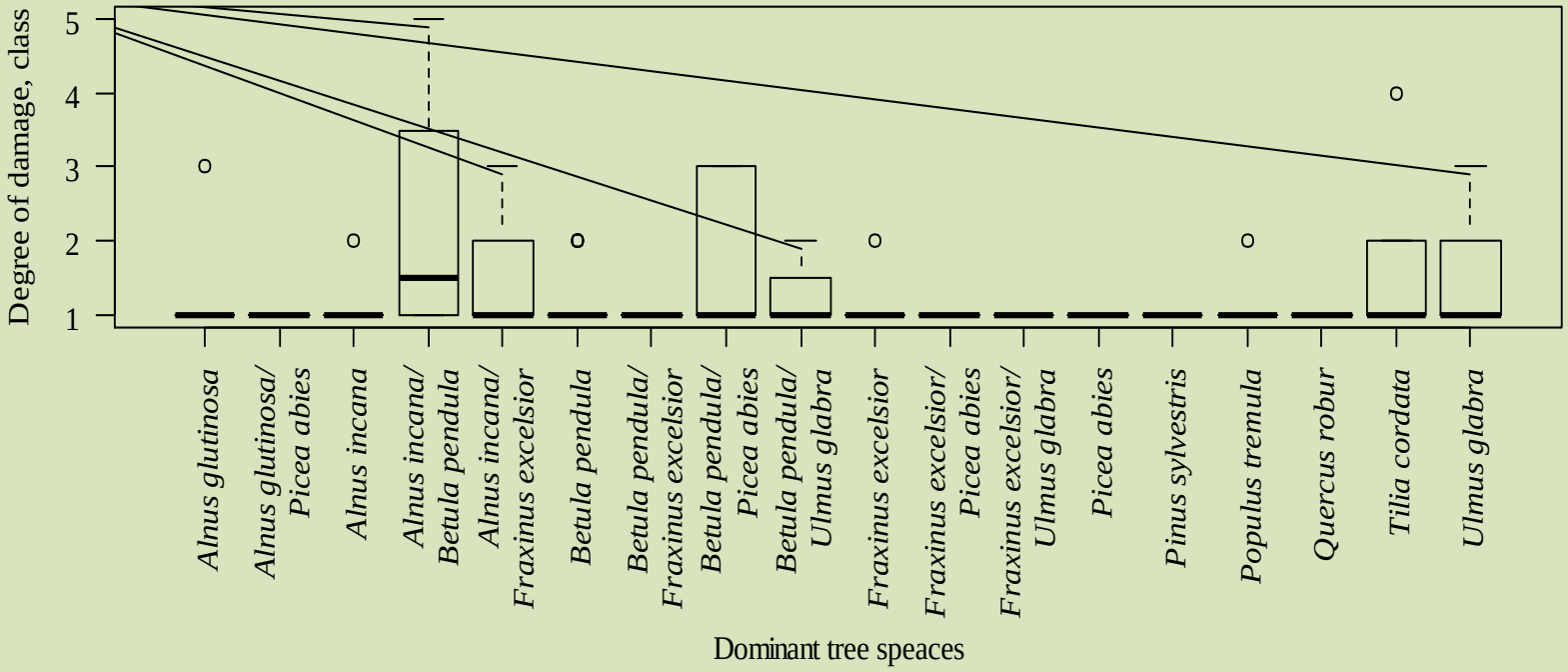
- GLM analysis showed that the new ash advance regeneration degree of damage does differ significantly among forest types.
- The highest degree of damage was established in Dryopteriosa and Aegopodiosa forest site type.



Results

Degree of *H. fraxineus* damage

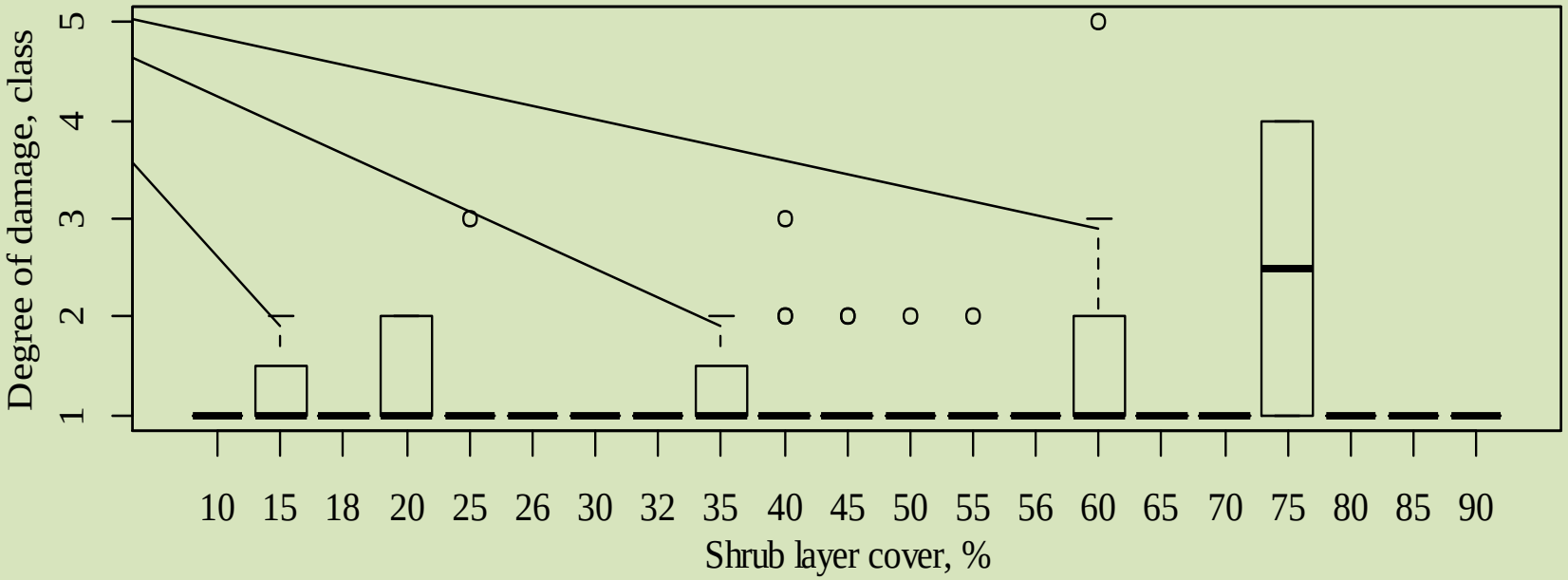
- Degree of *H. fraxineus* damage was statistically significantly different between stands with various dominant species (GLM analysis).
- The highest degree of damage of new ash trees was found in grey alder/birch stand.



Results

Degree of *H. fraxineus* damage

- Higher degree of damage can be established in stands with denser shrub cover.

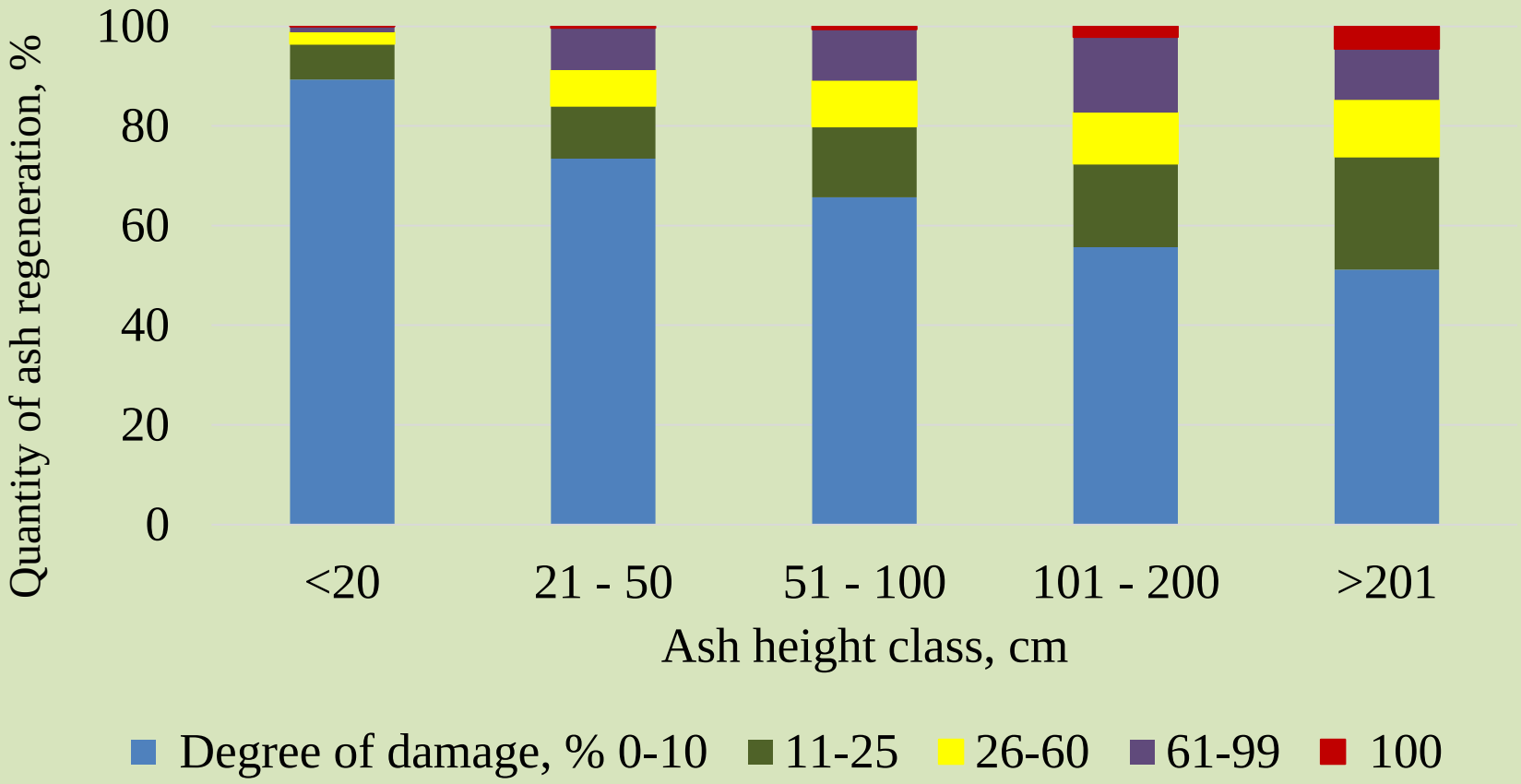


- In cases where ash cover in E3 layer was greater, the degree of young ash damage was higher, but correlation was not significant ($p = 0.06$, $tau = -0.129$).

Results

Degree of *H. fraxineus* damage

- The degree of damage rises as ash tree sapling height/age increases.



Conclusions

- Ash is not the dominant species in canopy layer anymore. Despite the fact that ash is the dominant species in advance regeneration, pure ash stands are not formed by means of natural regeneration, and ash will be maintained as an admixture species.
- The degree of damage has greatly decreased in the past three years.

This study was carried out within the scope of :

- Latvian State Forest project ‘Ash tree destruction and regeneration in Latvia’ [contract number: 5.5.-5.1_0017_101_14_28];
- Forest Sector Competence Centre project ‘Ecological risks of forest capital management- evaluation methods and recommendations for risk mitigation’ [contract number: L-KC-11-0004].





Thank you for your attention!
SILAVA