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Comparing the effectiveness of harvester use for thinning operations in beech and birch stands of 4th age class

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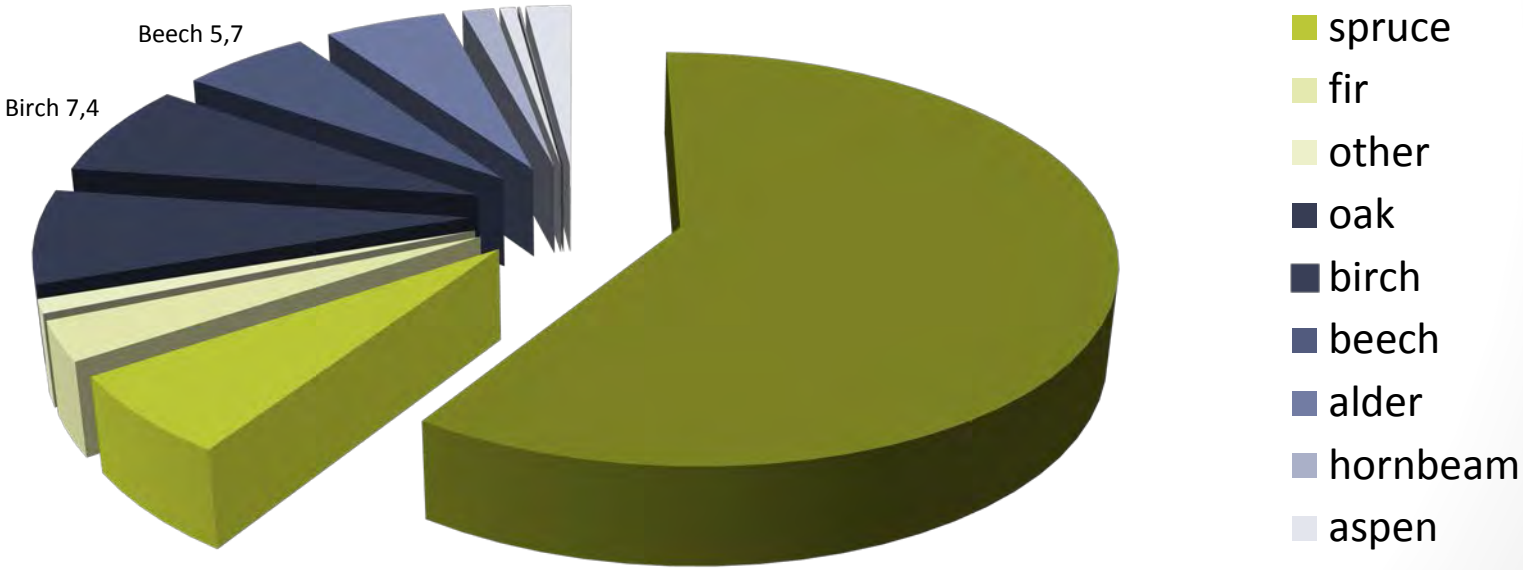
Species structure of stands in Poland (%, 2014)

33% until 2050!

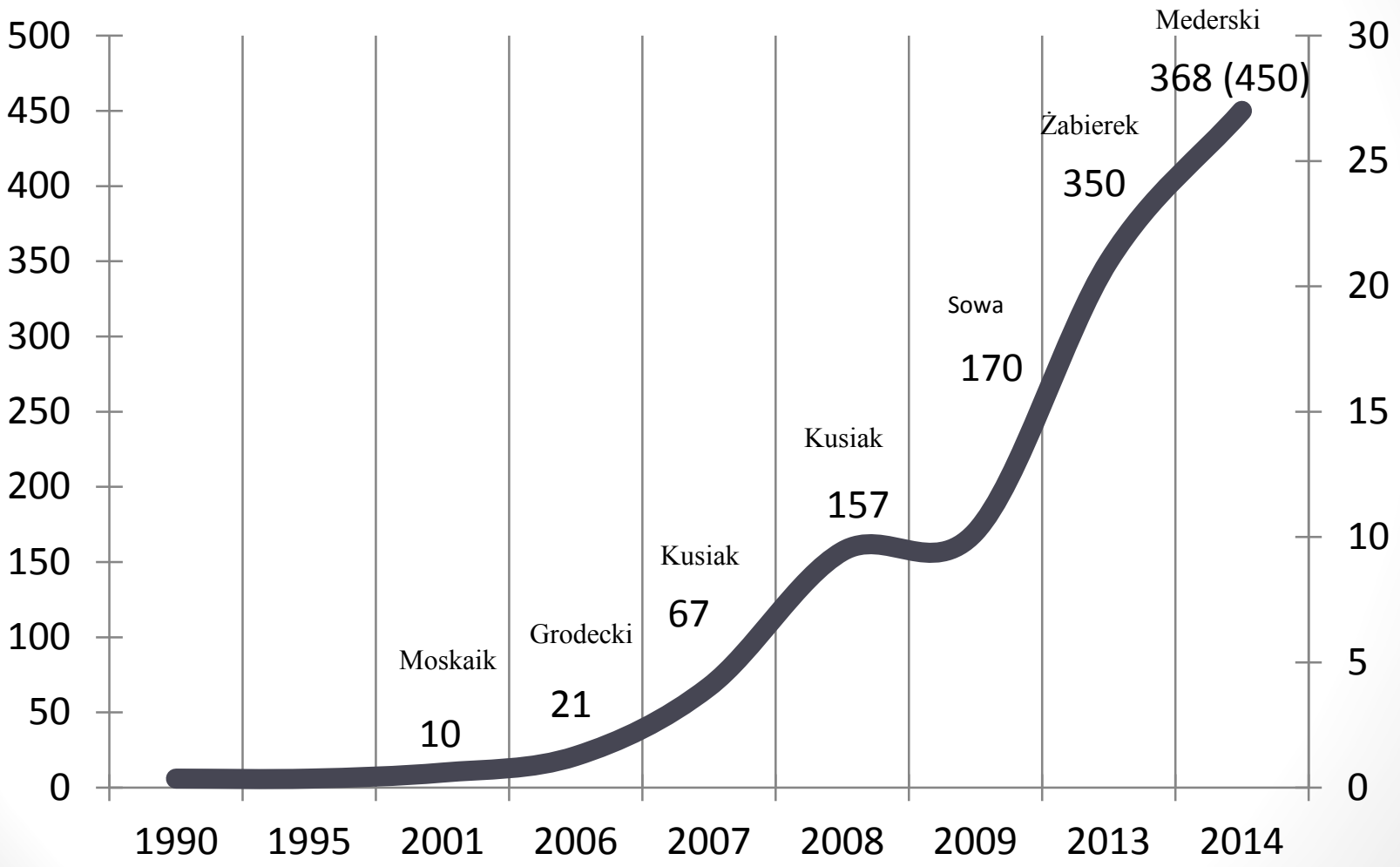
Broadleaved 30,4%



Coniferous 69,6%

Number of harvesters in Poland

40 mln m³/year



Objectives of the research:

1) operational productivity,
2) time consumption for delimbing and cross-cutting,
3) trunk use for logs.

Materials and methods

1. Stand measurements

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2. Work time recording

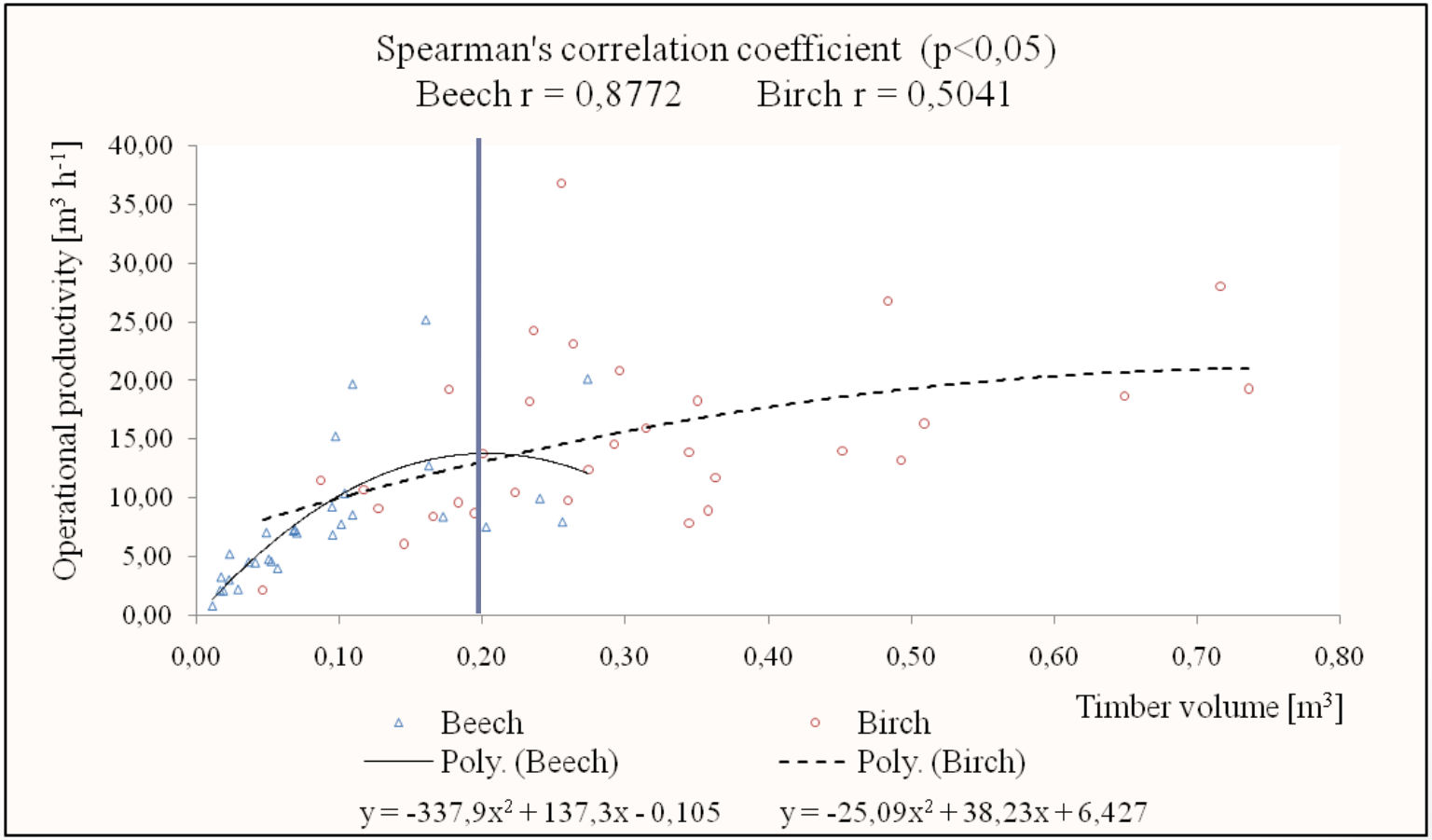
3. Wood measurement

For 60 trees with visible numbers:
upper diameter of the top log ->
total log length ->

Results

Operational productivity

Beech	Birch	Difference [%]
15,75 $m^3\ h^{-1}$	17,54 $m^3\ h^{-1}$	11

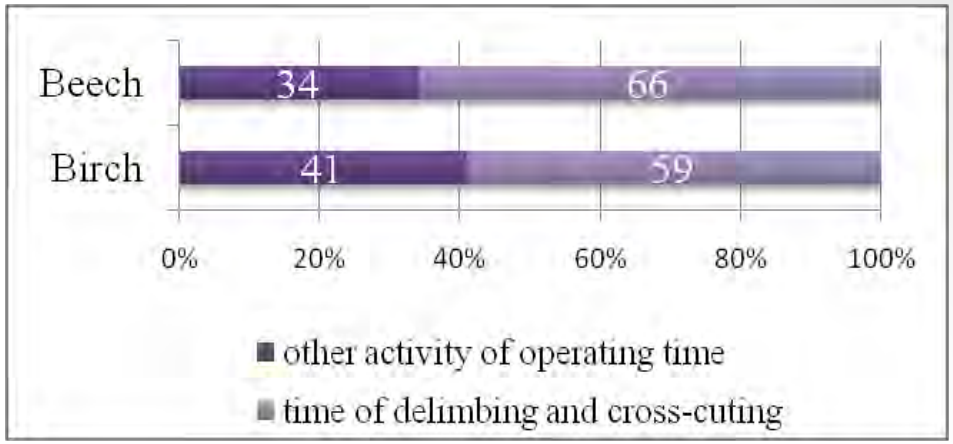


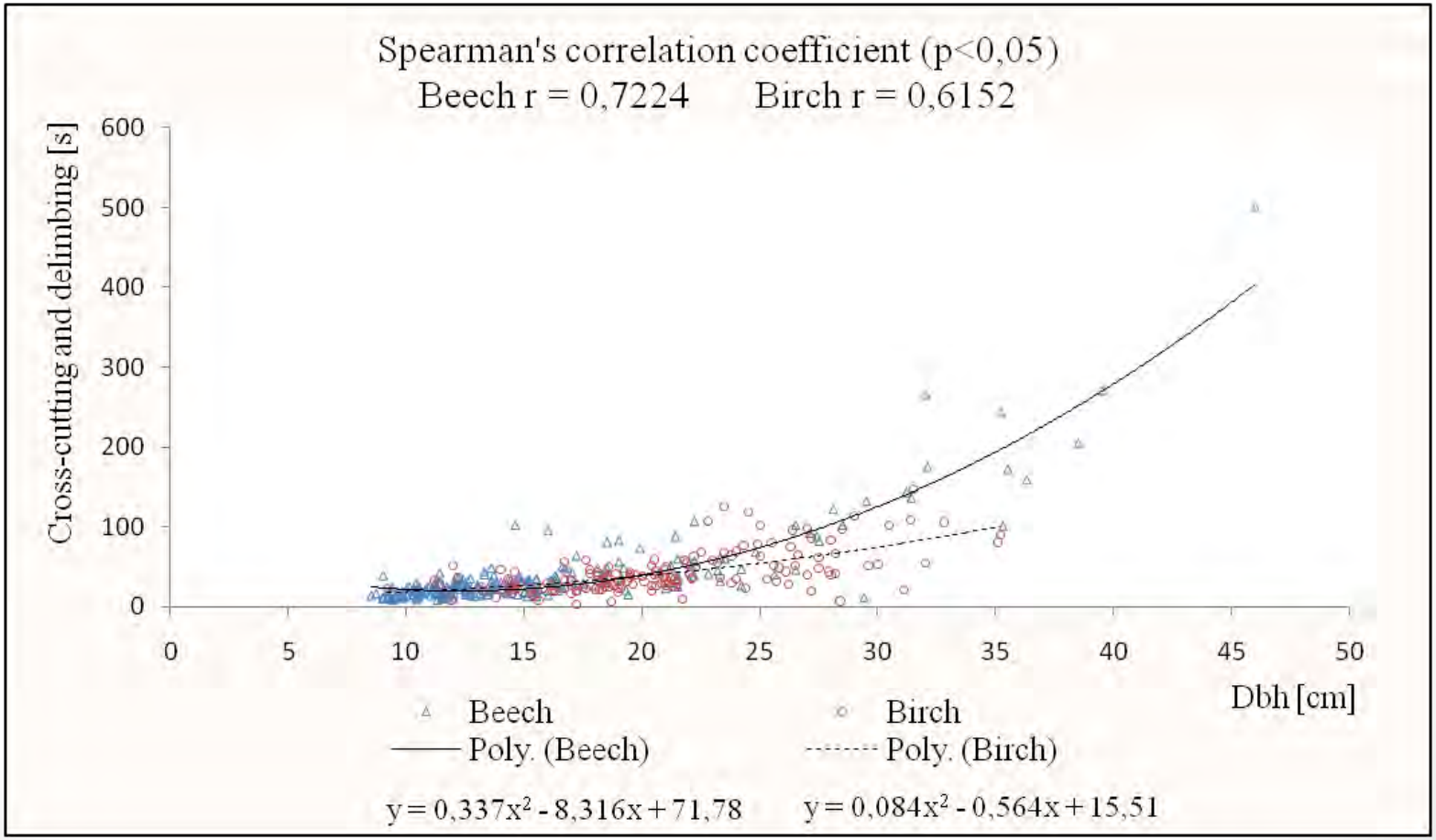
Species characteristics

Average data	Beech	Birch	Difference [%]
Age [years]	61	63	3
Wood hardness [MPa]	78	48	- 62
Dbh [cm]	15,6	20,8	33
Height [m]	15,3	19,5	27
Tree crown length [m]	8,8	8,3	- 6
Merchantable timber volume of a tree [m^3]	0,21	0,30	43

Results

Delimbing and cross-cutting

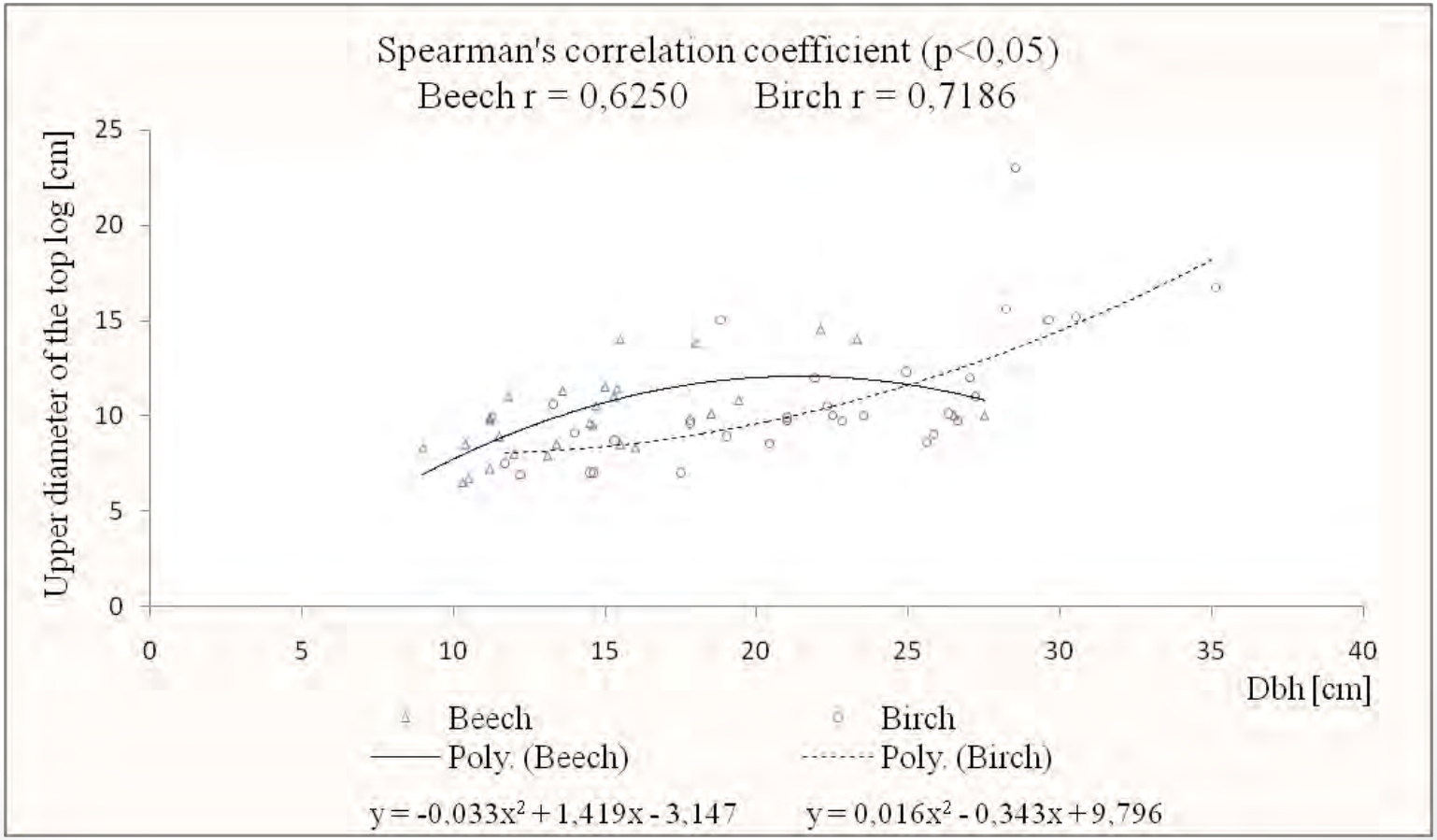




Results

Trunk utilization

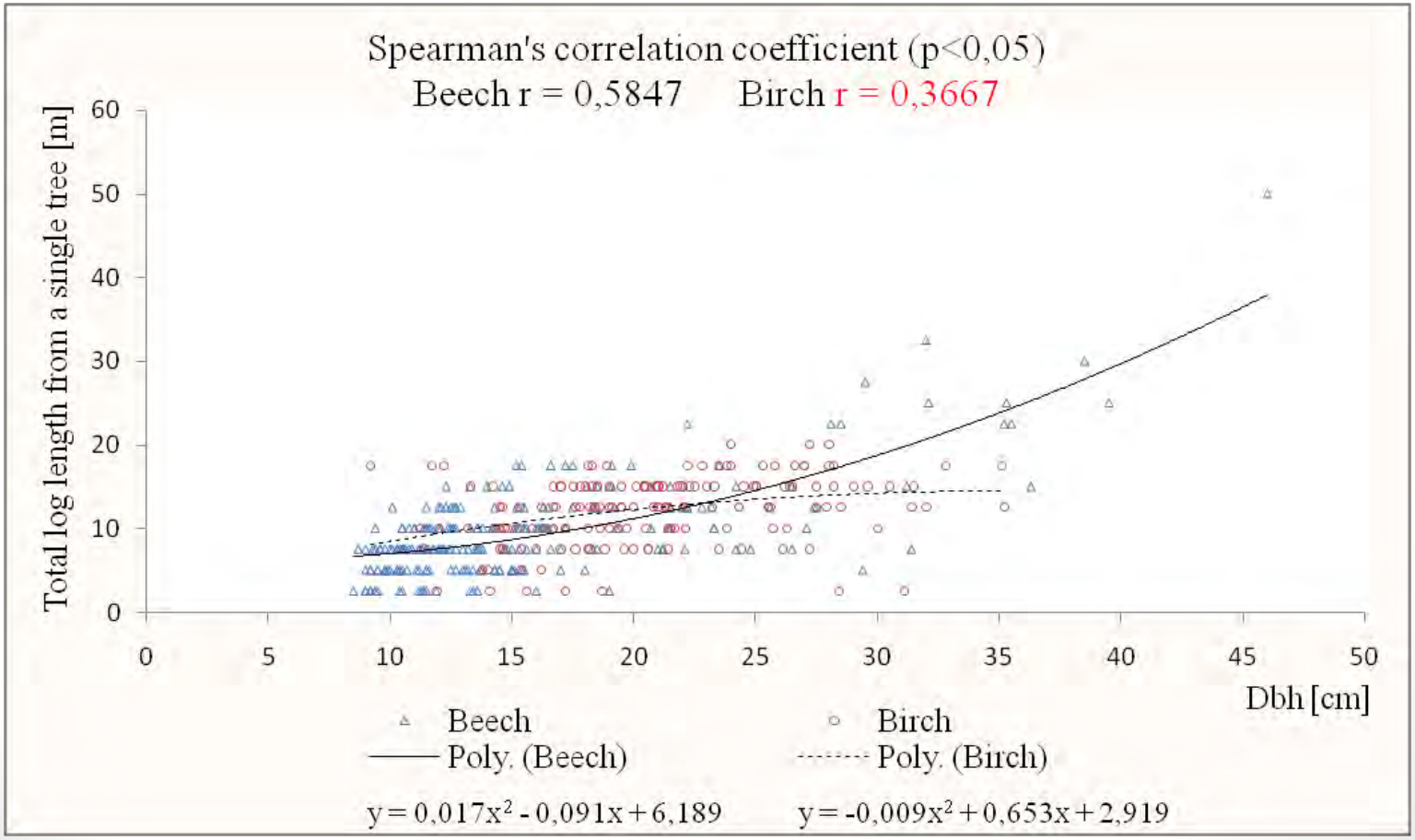
Average data	Beech	Birch	Difference [%]
Upper diameter of the top log [cm]	10,0	11	10



Results

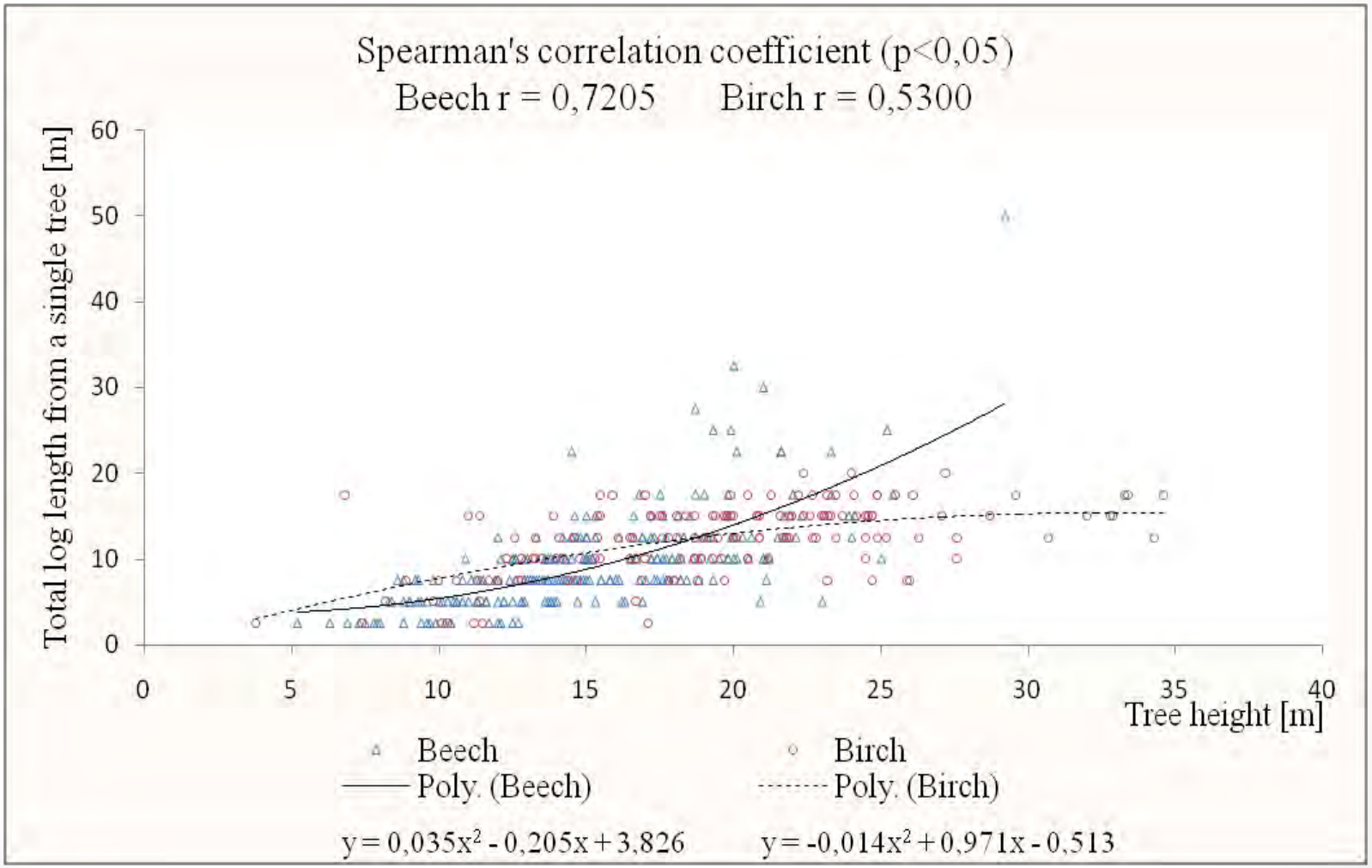
Trunk utilization cont.

Average data	Beech	Birch
Total log length from a single tree [m]	9,6	12,3
% of tree height	63	63
% of tree crown length	35	13



Results

Trunk utilization cont.



Conclusions

1) Beech and birch harvesting is possible using the tested machine with acceptable productivity.
2) The bigger average volume of the birch trees (compared to beech) had a significant impact on harvester productivity.
3) The birch branches were more problematic for delimbing.
4) The amount of merchantable timber volume left after harvesting depends not only on harvester head capabilities but also on operator motivation.

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