

THE PROPORTION OF HEARTWOOD, WOOD MOISTURE AND DENSITY IN CONIFER (*PINUS SYLVESTRIS* L., *PICEA ABIES* (L.) H.KARST.) TRUNKS

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Topicality

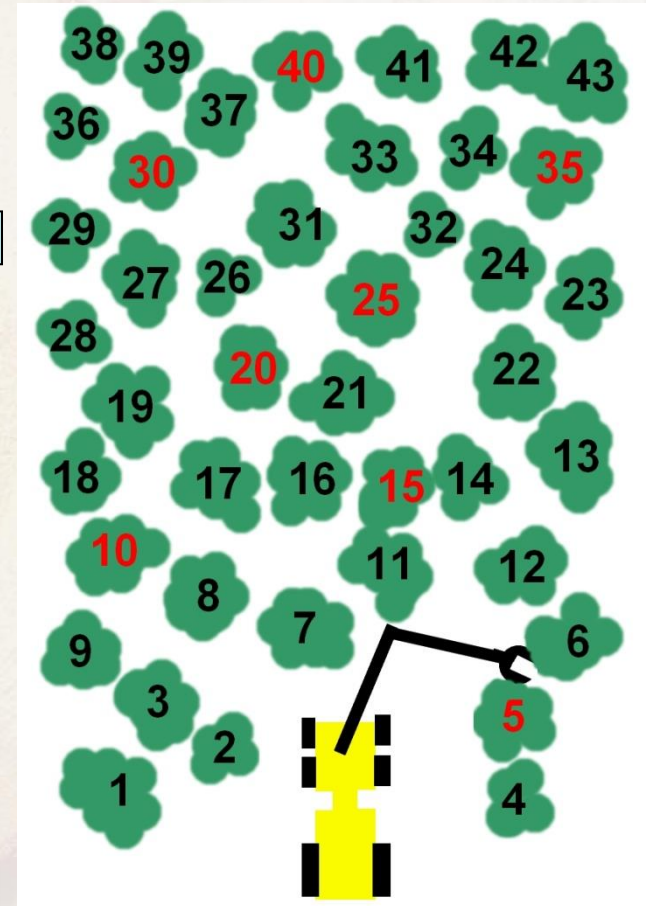
- According to weight restrictions in forest logging and timber transportation technologies it is necessary to evaluate tree trunk and stem weight. Important part in weight evaluation is to evaluate wood moisture and density. For making this evaluation precisely prediction of freshly felled wood density is needed.
- The scaling of wood by weight, the subject has become a point of immediate concern who buy and sell green wood.



Methods (1)



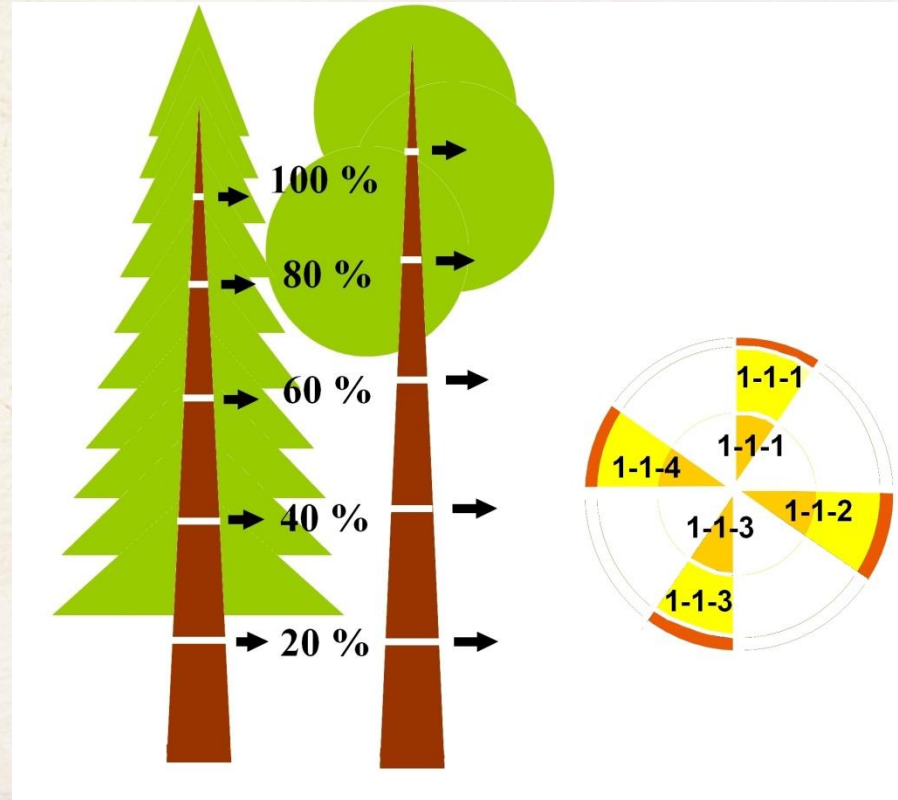
- Forest types – *Vacciniosa*, *Myrtillosa*, *Hylocomiosa*, *Oxalidosa* and *Myrtillosa mel.*,
- Age of trees ranges – from 61 to 143 years old.
- Sample plot – 7-10 sample trees were chosen according to uniform placement principle, distributing them in proportion with the distribution of the number of trees according to diameter classes.



Methods (2)

- Sample discs – 5cm thick starting with a 20% distance from the butt end of the trunk;
- The diameter of the sample disc from the top of the trunk (last sample disc) was 5 – 10 cm.

In total 989 pine and 676 spruce sample discs were prepared and treated.



Wood moisture content changes depending on diameter in %

Scots pine				Norway spruce			
Diameter, cm	Mean	n	Std. D.	Diameter, cm	Mean	n	Std. D.
5	142.3	5	11.8	5	137.5	14	12.7
10	139.3	141	21.0	10	128.6	149	18.4
15	117.0	251	23.1	15	113.1	185	17.9
20	99.9	263	17.9	20	105.1	168	19.0
25	91.3	190	14.7	25	99.1	110	17.3
30	86.0	97	12.0	30	96.6	42	12.9
35	85.5	42	11.2	35	89.7	8	13.6

Wood density (green) changes depending on diameter, kg m⁻³

Scots pine				Norway spruce			
Diameter, cm	Mean	n	Std. D.	Diameter, cm	Mean	n	Std. D.
5	963	5	25	5	951	14	33
10	939	141	69	10	910	149	65
15	862	251	76	15	846	185	69
20	814	263	61	20	815	168	69
25	803	190	57	25	796	110	68
30	805	97	58	30	800	42	51
35	813	42	57	35	784	8	48

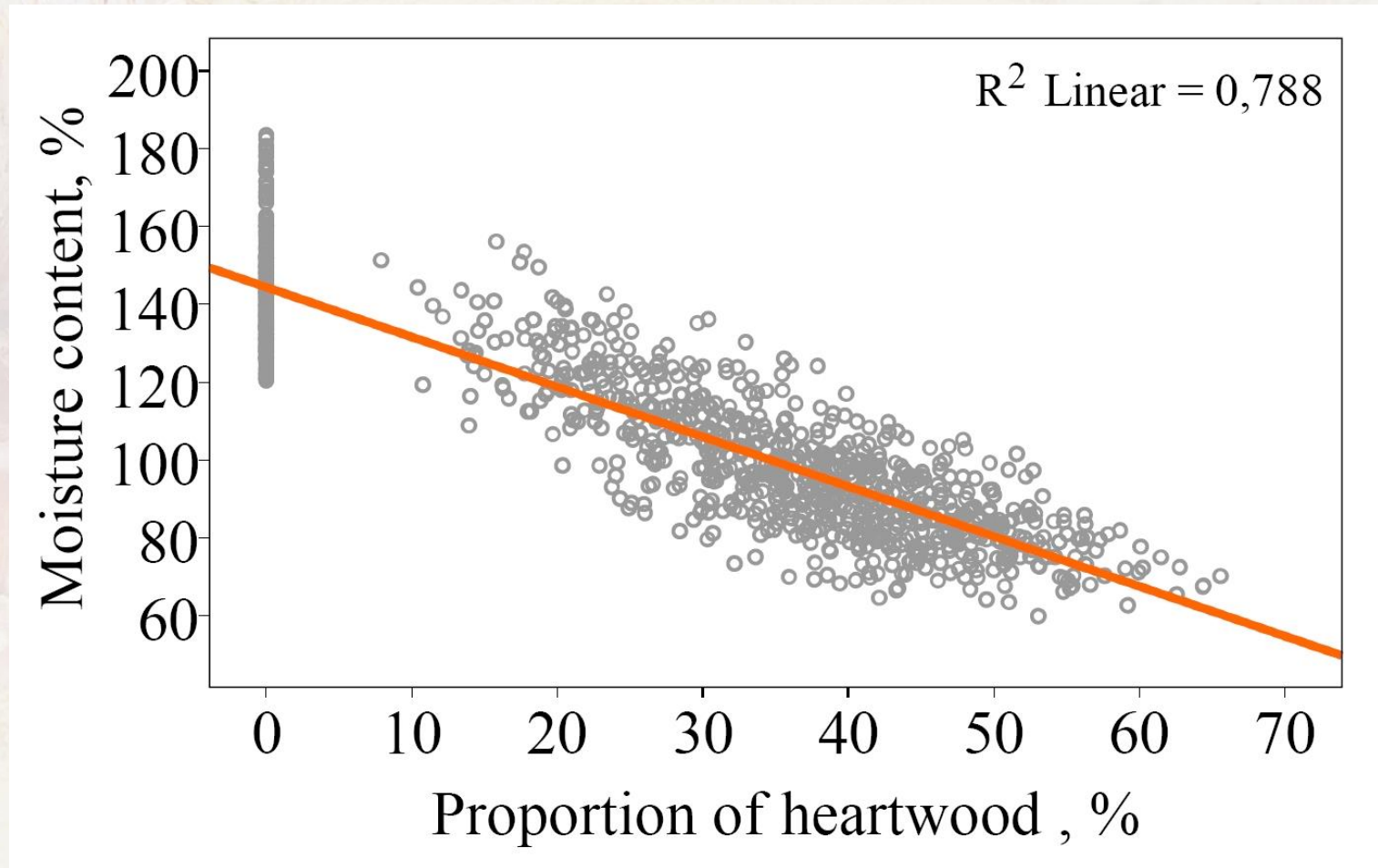
Wood moisture and density coherance

- Sapwood
 - 3 – 4 time more moist than heartwood
 - 1.6 – 1.8 times denser than heartwood

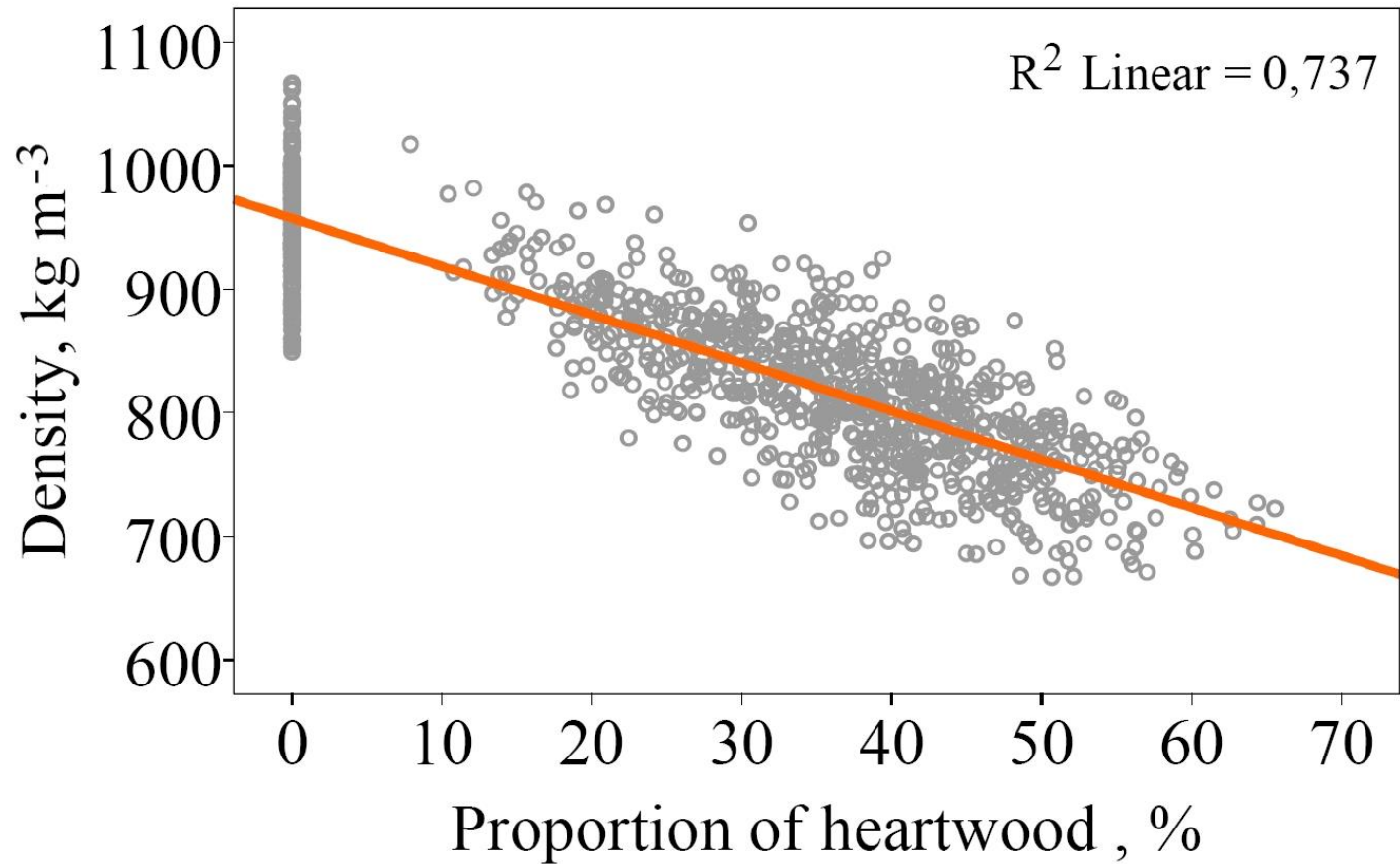
By increase of diameter wood moisture and density is decreasing, this is explained by increase of proportion of hearwood



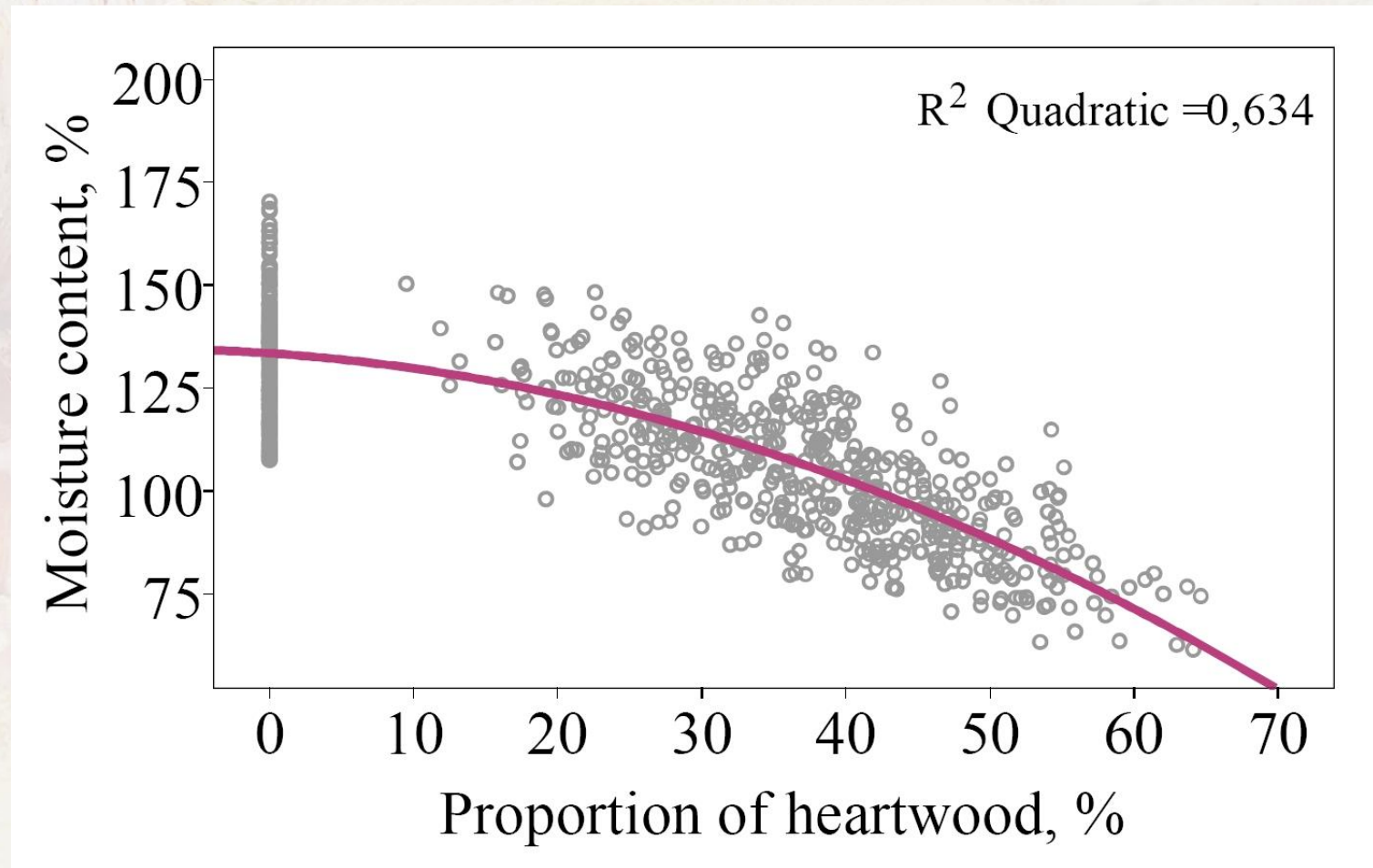
Scots pine (*Pinus sylvestris* L.)



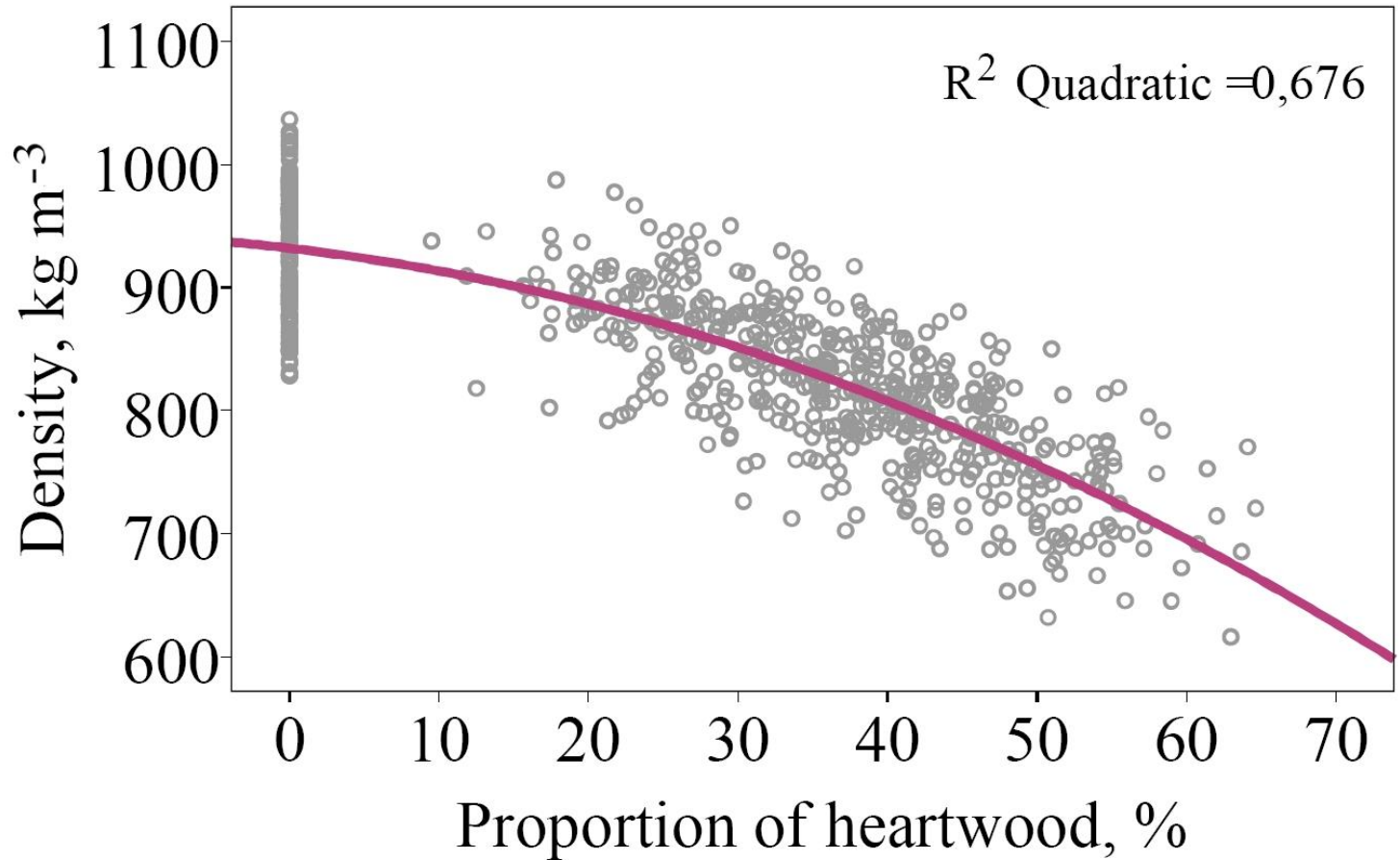
Scots pine (*Pinus sylvestris* L.)



Norway spruce (*Picea abies* (L.) H.Karst.)



Norway spruce (*Picea abies* (L.) H.Karst.)



Conclusions

- Wood moisture and density differ according to diameter which can be explained by proportion of heartwood;
- The values of the coefficient of determination (R^2) are within the range of 0.634 to 0.788, which shows that in 63-79% of the cases the changes in wood moisture and density can be explained by the proportion of heartwood;
- The trunk diameter, similarly as it is in the case of heartwood proportion, decreases towards the top of the trunk, but the moisture content and density of wood increase towards the top of the trunk;
- It is difficult to automatically determine the proportion of heartwood, especially that of the colourless spruce heartwood.

ACKNOWLEDGEMENT

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Thank you for attention!

