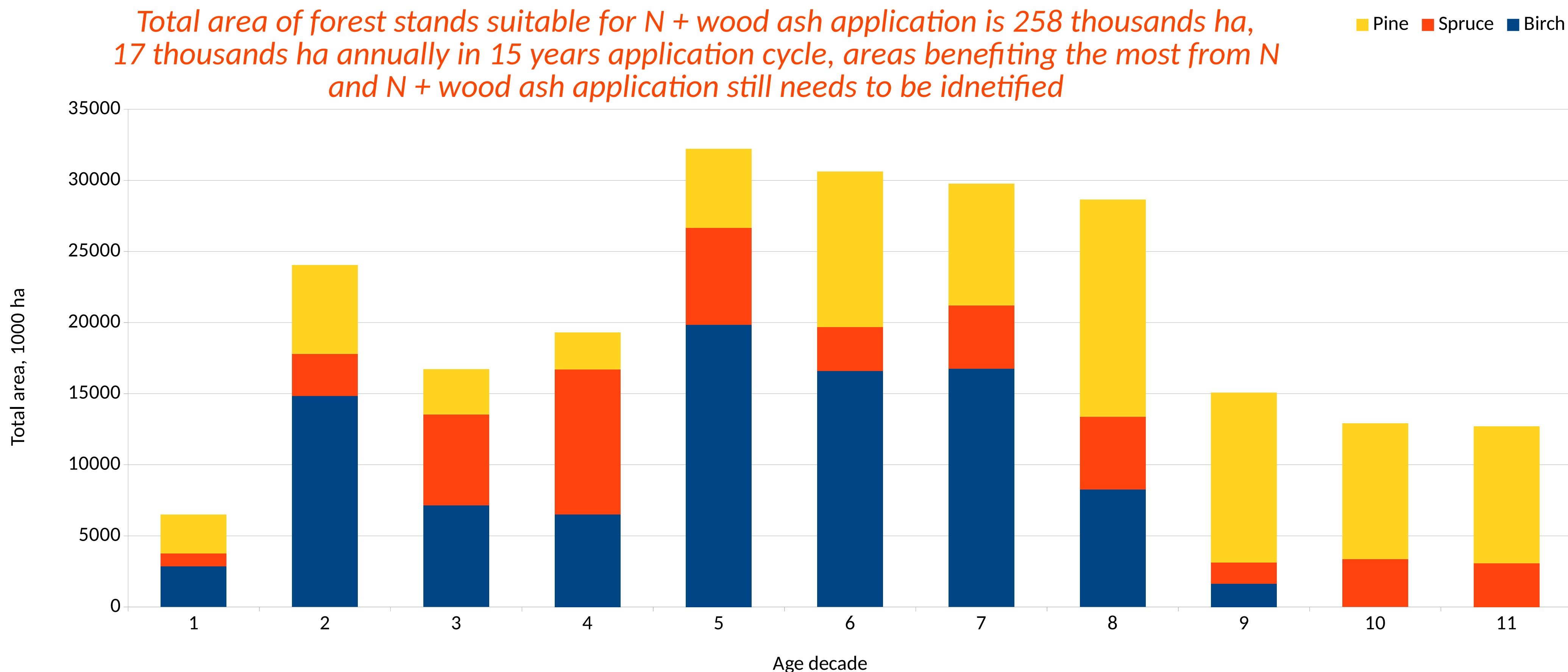


- Experimental plots were established in 2016 and 2017 in forest stands on drained mineral and organic soils.
- **The method should be evaluated also on dry and moist mineral soils.**
- Fertilizer dosage **100 kg N ha⁻¹** and **3 tonnes ha⁻¹** of wood ash 10-15 years before thinning. *Repeated treatment is considered after thinning.*
- Cost of spreading – 110 € ha⁻¹ including fertilizer for N and 55 € ha⁻¹ for wood ash, total 165 € ha⁻¹ (135 € ha⁻¹ if materials are mixed before application).

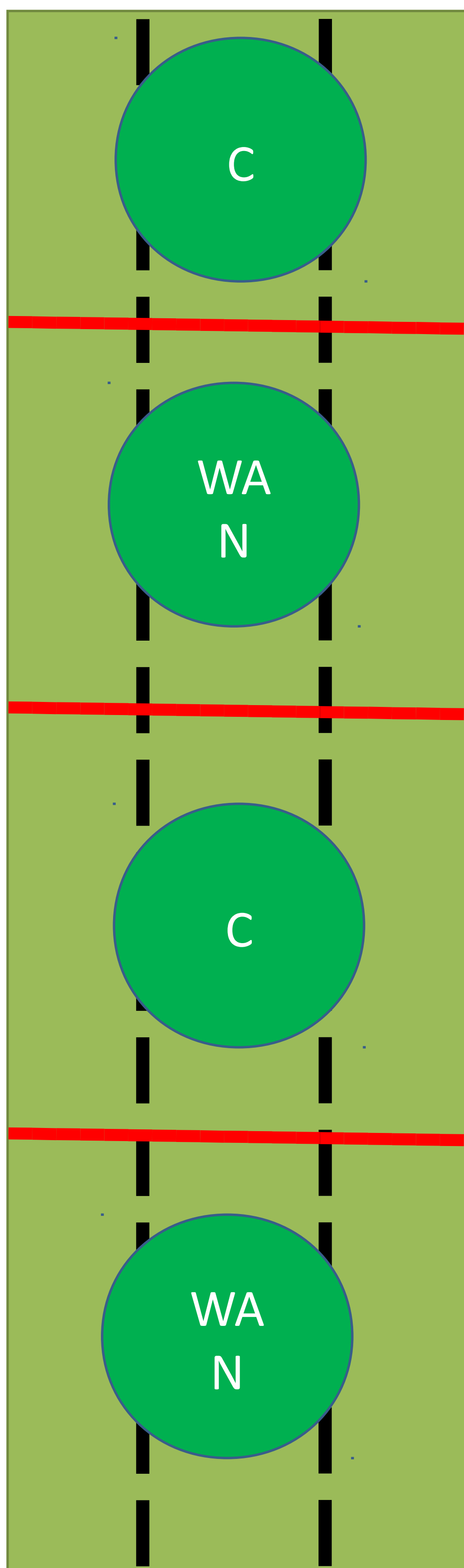
- **Use of smaller carriage (500 kg) reduces productivity by 30% (to 0.4 ha h⁻¹).**
- **Savings of wood ash land-filling cost – 118.5 € ha⁻¹.**
- Proposed additional increment – 10-15 m³ ha⁻¹.
- Fertilization cost:
 - if saving of land-filling costs not considered – 13.5-16.5 € m⁻³;
 - if savings of land-filling costs considered – 1.7-4.6 € m⁻³;
- Additional cost should be considered due to treatment (hardening) of wood ash.
- **Capacity to consume wood ash in forest fertilization on drained soils – about 52 thousand tonnes annually (86 thousand tonnes if 5 tonnes are applied) in 15 years application cycle (up to 17 thousands ha annually).**

Total area of forest stands suitable for N + wood ash application is 258 thousands ha, 17 thousands ha annually in 15 years application cycle, areas benefiting the most from N and N + wood ash application still needs to be identified



Drained forest stand mechanized fertilization (wood ash and NH_4NO_3)

- About 33 % of forest in Latvia on drained soils;
- Deficiency of K, P and other elements.



Joint Stock Company "Latvia's State Forests" (LVM) founded research programm: KAAUPP

Myrtillosa mel.

Picea abies

Myrtillosa turf. mel.

Betula pendula

Pinus sylvestris

- 500 m² sample plots;
- Tree measurements;
- Soil samples;
- Foliar samples;
- Vegetation description;
- Leaf area index;
- Soil water analyses.

WA – 3 t ha⁻¹ wood ash from fluedized bed boiler
 N – 445 kg ha⁻¹ amonium nitrate (34.4% N)
 C – control

Wood ash parameters

	pHH ₂ O	P	K	Ca	Mg	Mn	Fe	Cd	Pb	Cr	Ni	Zn	Cu
Content, g kg ⁻¹	13.1	8	28	136	20	2.2	6.3	0.0035	0.005	0.002	-	0.9	-
Dose kg ha ⁻¹		24	84	408	60	6.6	18.9	0.0105	0.015	0.006	-	2.7	-



LSFRI Silava designed modular ash spreader

- Ash spreading during february of 2017:
 - Belarus 952 + 0.5 m³ fertilizer spreader (A);
 - Productivity 0.4 ha h⁻¹.
- N spreading during july of 2017:
 - Valtra T191 + 1 m³ fertilizer spreader (B);
 - Productivity 1.5 ha h⁻¹.

- Experimental area – 42 ha;
- Treated area – 11 ha;
- 66 sample plots;
- Aprox. 5 t of amonium nitrate and 33 t of wood ash;
- 5 years of monitoring