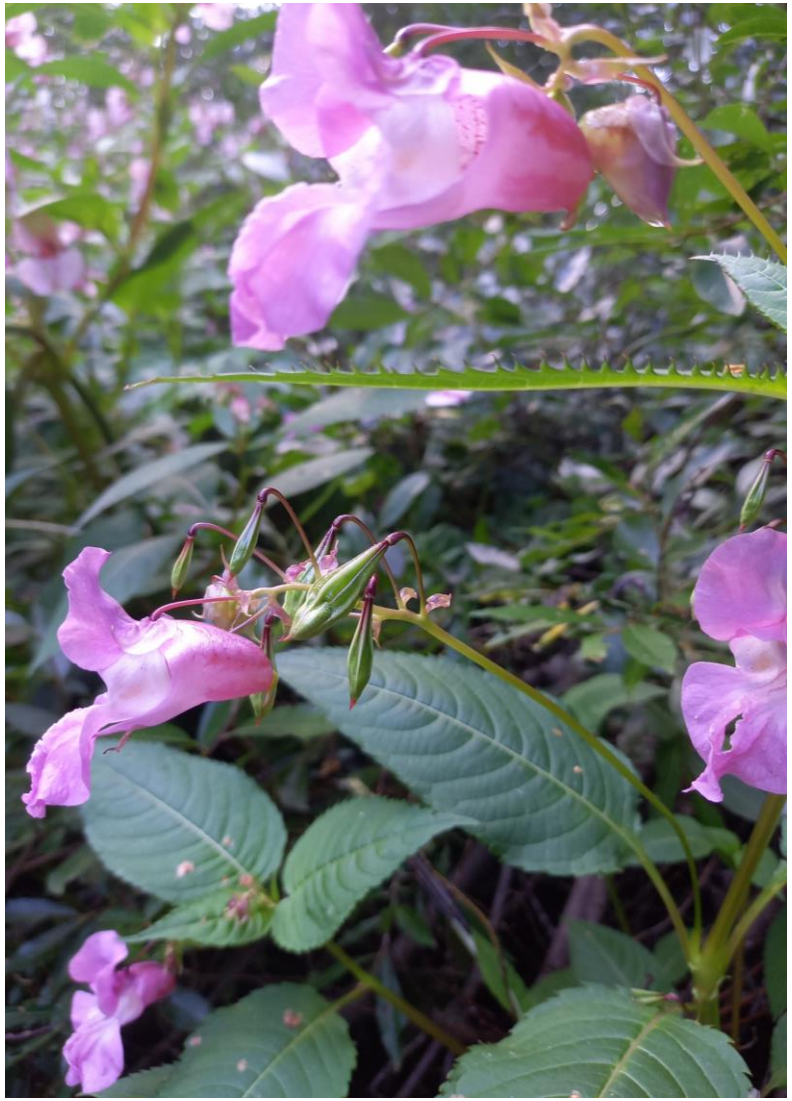


MAA- JA
KOTITALOUSNAISET

How to handle IAS plant waste & its potential for bioenergy production

28.11.2023

Marjaana Hassani, Rural Women's Advisory Organization

BEAUTY – BUT A BEAST: practical tools for municipalities and prevent the impact of invasive alien plants

MAA- JA
KOTITALOUSNAISET

How plant species distribute?

- Plants (IAS) can spread by air, water, soil or by living organisms
- Growth can continue from either seeds, roots or rhizomes
- Especially dormant seeds can tolerate changing environmental conditions (winter, fire, drought, flood)

Seed spread species

- Dormant seeds are the biggest headache
- Thermal resistance, moisture tolerant
- Seeds of IAS may survive through processes like composting and anaerobic digestion, and viable seeds can disperse via soil transfers
- Survival of seeds depends on processes and should be validated

MAA- JA
KOTITALOUSNAISET

Limitations for handling IAS plant waste

- Need for environmental permit?
- Restrictions of local waste treatment center
  - E.g. In Mustankorkea Ltd. IAS waste must be in package -> waste incineration plant

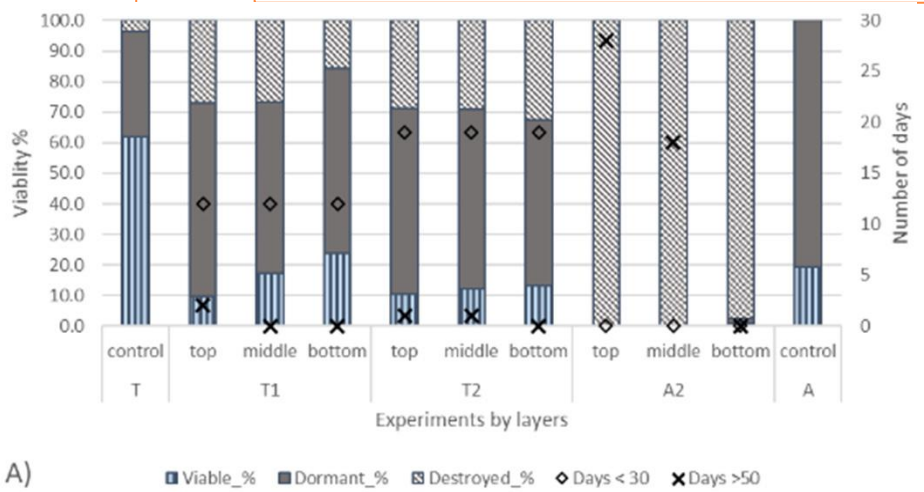
MAA- JA KOTITALOUSNAISET

Composting

MAA- JA KOTITALOUSNAISET

- Treatment is not sensitive for ground materials
- Waste can be transformed into organic soil

- Time of treatment is crucial
- Heat

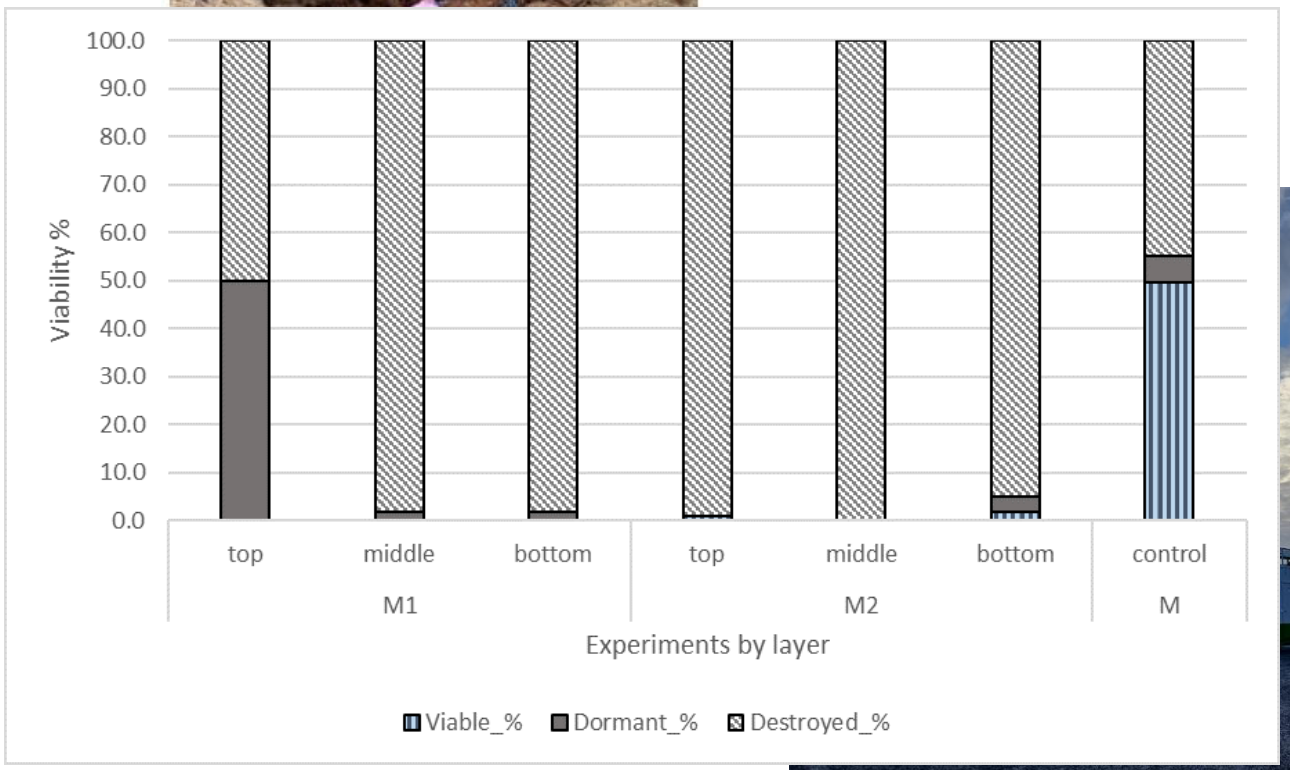


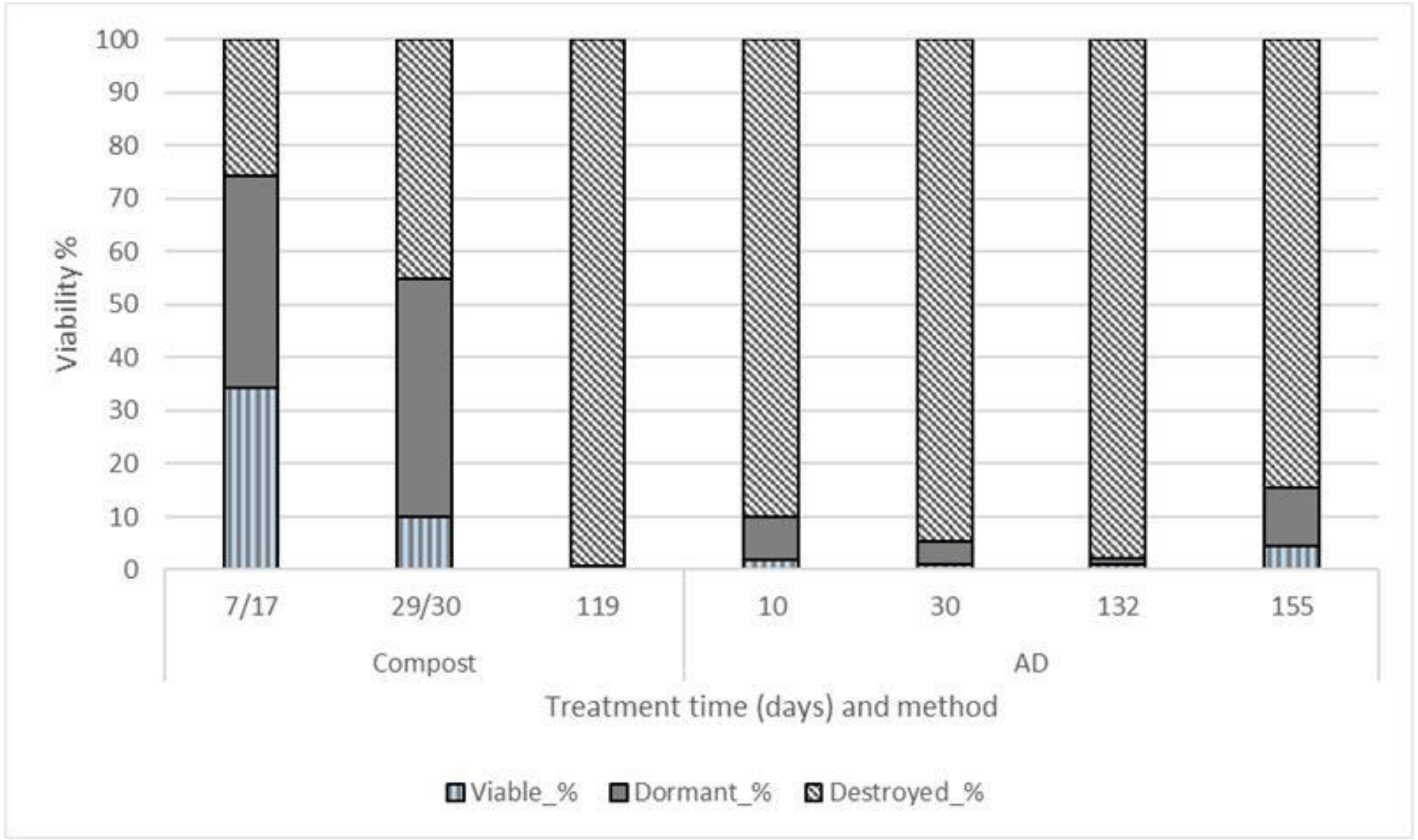
Survival rate of *Lupinus polyphyllus* seeds were in average between 6.3-6.9% in AD and 8,3% viable—31% dormant in composting. Windrow composting presented rates of 2,6% viable and 14,2% dormant seeds of lupin.

Anaerobic digestion

MAA- JA KOTITALOUSNAISET

- Dry/Wet process
- Patch reactor/ continuous-load digester
  - time!!!
- Hygienization 70°C/1hr is not enough!
- **Combining processes guaranties result**

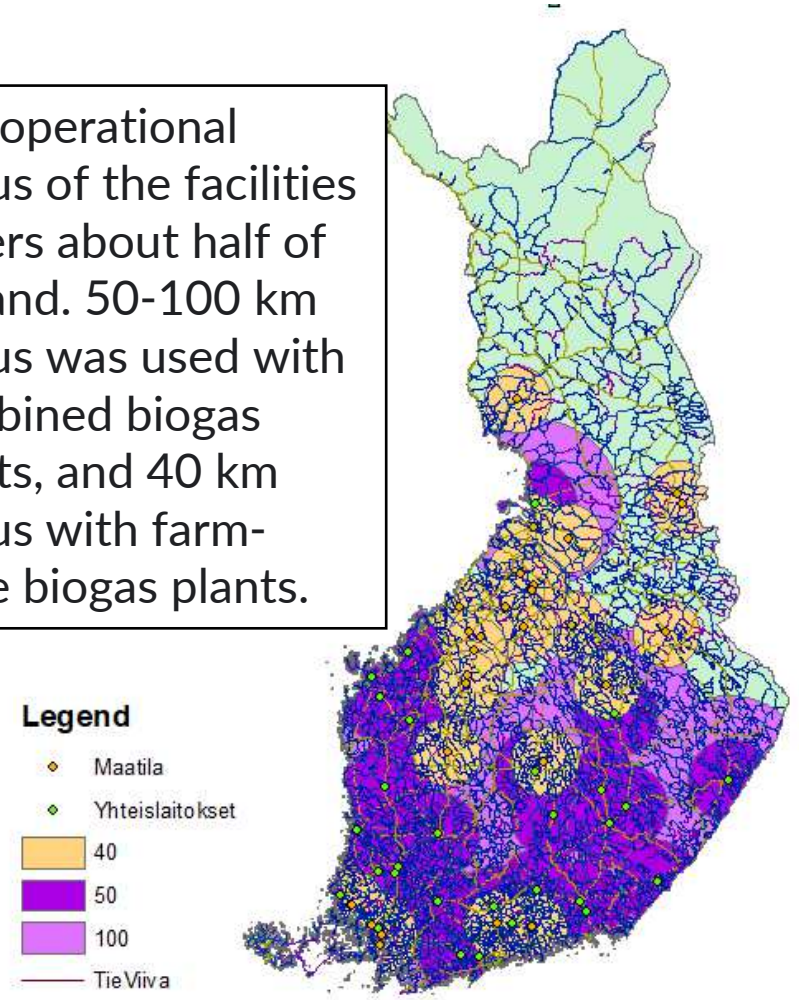



100
90
80
70
60
50
40
30
20
10
0
Viability %
7/17
29/30
119
10
30
132
155
Compost
AD
Treatment time (days) and method
Viable_%
Dormant_%
Destroyed_%

Potential biomasses

- Road verge area of 2m width (in government district) covers **23172 ha**
- In middle Finland 2020-2022 the average production
  - 5,96 tFM/ha (tons of fresh matter per hectare) with lupin
  - 3,36 tFM/ha without
  - maximum yield was 9,7 tFM/ha
- If compared to other studies
  - Yield in road verges 3,09-5,15 tDM/ha/a
  - In lupin infested mountain meadows yield varied 2,8 tDM/ha — 3,2tDM/ha e.
- This would give approx. 301,2-509,8 GWh/a
- **No additional costs of fertilizers, tillage or pest control**

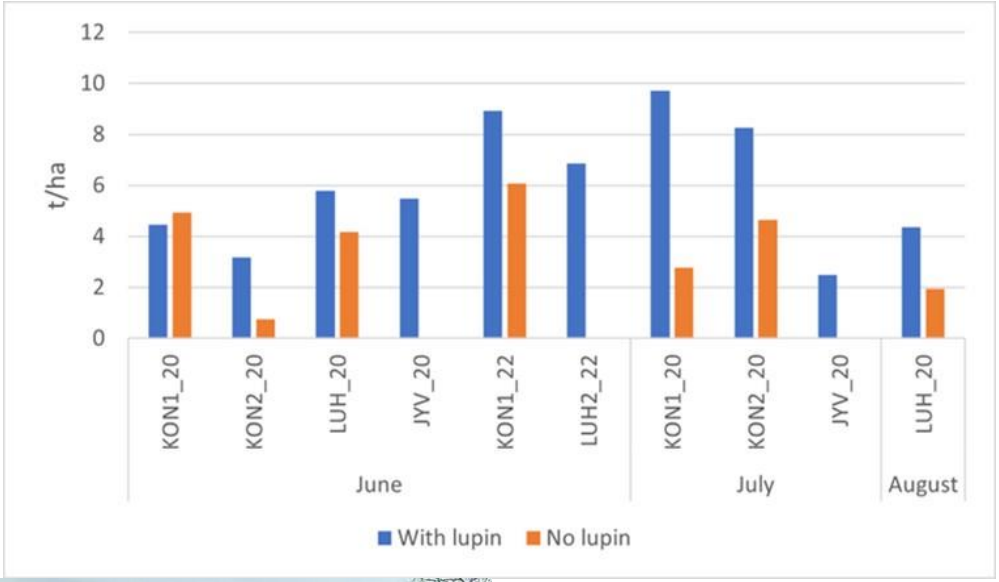
The operational radius of the facilities covers about half of Finland. 50-100 km radius was used with combined biogas plants, and 40 km radius with farm-scale biogas plants.

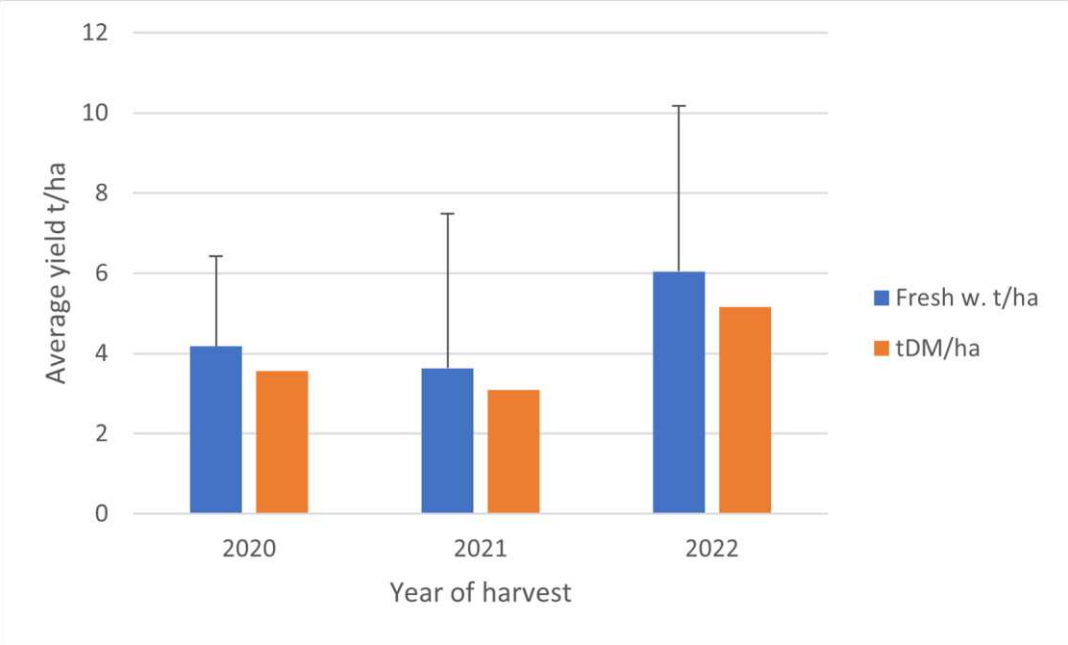


MAA- JA KOTITALOUSNAISET

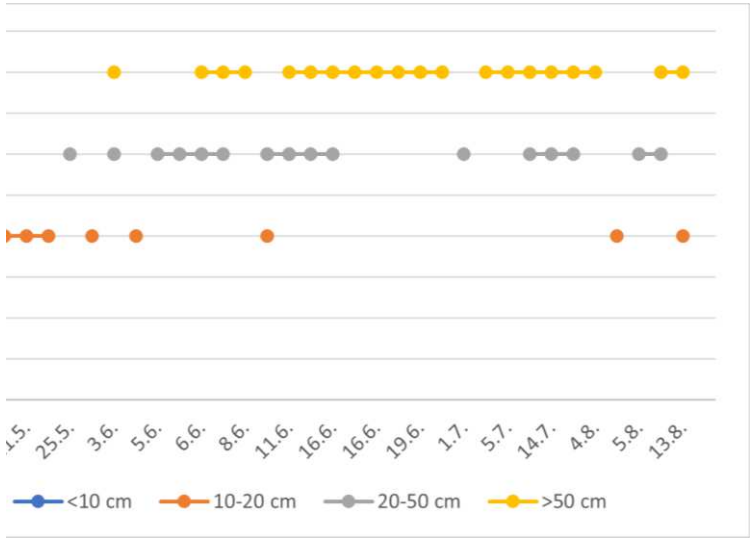
Harvesting road verges

- Biomasses are heterogenic
- For restricting IAS harvesting should be done in early summer and repeated by need





MAA- JA KOTITALOUSNAISET



MAA- JA KOTITALOUSNAISET

Time / lowing	Early June	Late June	Early July	Late July	Early August	Late Aug
1 mowing in June	Multia 2020-2022	Multia 2020	Multia 2020		Multia 2021	
1 mowing in August	Multia 2021 LUH 2022	LUH 2022			Multia 2021	LUH 20
2 mowings (June, July or lune, August)	JYV 2020 KON 2021	KON 2022	JYV 2020 KON 2021		KON 2022	
2 mowings (June, July or lune, August)	LUH 2020	LUH 2020			LUH 2020	
3 mowings (June, July, August)	KON 2020		KON 2020		KON 2020	

Thanks!

LET´S KEEP IN TOUCH!

Maa- ja kotitalousnaiset

@maajakotitalousnaiset

@maajakotitalous

www.maajakotitalousnaiset.fi

MAA- JA
KOTITALOUSNAISET