Modern Steep Terrain Harvesting in Central Europe

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Roadmap

European harvesting systems for steep terrain

Why we need mechanization on steep terrain?

(Unsolved) problems & future challenges
Chain saw, tower yarder and processor (Whole-tree)
Harvester and cable-forwarder (Cut-to-length)
Tethered harvester and forwarder (Cut-to-length)
Harvester and radio-controlled trailer (Cut-to-length)
Chain saw, excavator with winch and processor (whole tree)
15 manufactures
63 models
7 countries

Source: Wassermann, 2018
Tower yarder carriers (1)

tractor

trailer

truck
Tower yarder carriers (2)

evacuator
Tower yarder specifications
Change over time

Line Speed
- 7.3 m/s
- 5.7 m/s

Tower height
- 10.7 m
- 10.2 m

Operation distance
- 630 m
- 510 m

Pulling force
- 36 kN
- 35 kN

Source: Wassermann, 2018

7 manufactures
20/27 models
Mechanized timber harvesting
Cost comparison

- Chain Saw and Tower Yarder with Processor: 26.5, 43.5
- Cable Assisted Harvester and Forwarder: 17.5, 29.0
- Harvester and Forwarder: 15.5, 21.5

Costs [Euro/m³]
Working accidents
Chain saw versus harvester

Source: Niedersächsische Landesforste
Whole tree cable yarding
SWOT-Analysis

- Harvesting residues
- Efficiency
- Nutrient loss
- Stand damage
- Physical workload
- Recruiting & Training
- Length measurement
- Forest protection
- Working accidents
- Harvesting residues
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Steep terrain harvester
Harvester and forwarder integrated winch systems

HAAS HIGHGRADE (JOHN DEERE)
HERZOG ALPINE SYNCHROWINCH (PONSSE)
KOMATSU SPW
HSM FORCE-SYNCHRO DRIVE HSW 15
Anchor machine winch systems
….. the machine must remain stable and have traction without cable assist.
Outlook

◆ Whole tree cable yarding will play a major role for timber harvesting in steep terrain.

◆ Cable assist harvester and forwarder are efficient harvesting systems for steep slopes (thinning and clear cut operations).

◆ Still discussion about the operating limits with this technology.

◆ Tree anchors fail often in small sized thinning stands.
Thank you for your attention!