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Agroscope Reckenholz-Tänikon Research Station ART

Operating limits to mechanisation in mountain areas

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Operation limits given in scientific reports:



Reference: (Ott 1979)



Mechanisation	Operation Limit
Single-axle mower	50 %
Tractor	35 %
Two-axle mower	60 %



Practical advices in Magazines:



Switzerland: Burkhalter 2004

“Mit Traktor und Scheibenmähwerk über 60 % Hangneigung”

“With tractor and disc mower... above 60 % inclination”



Austria : Wippl 2006

“Lindner Geotrac 35 – 40 % Hangneigung ... 60 % sind möglich”

“Lindner Geotrac 35 – 40 % inclination ... 60 % are possible”



Determination of operating limit



Test bench:

Statically break
over point
at 100 %
inclination

Practice:

Operation limit
from 35 to 50 %
inclination



Alternative: Survey in situ



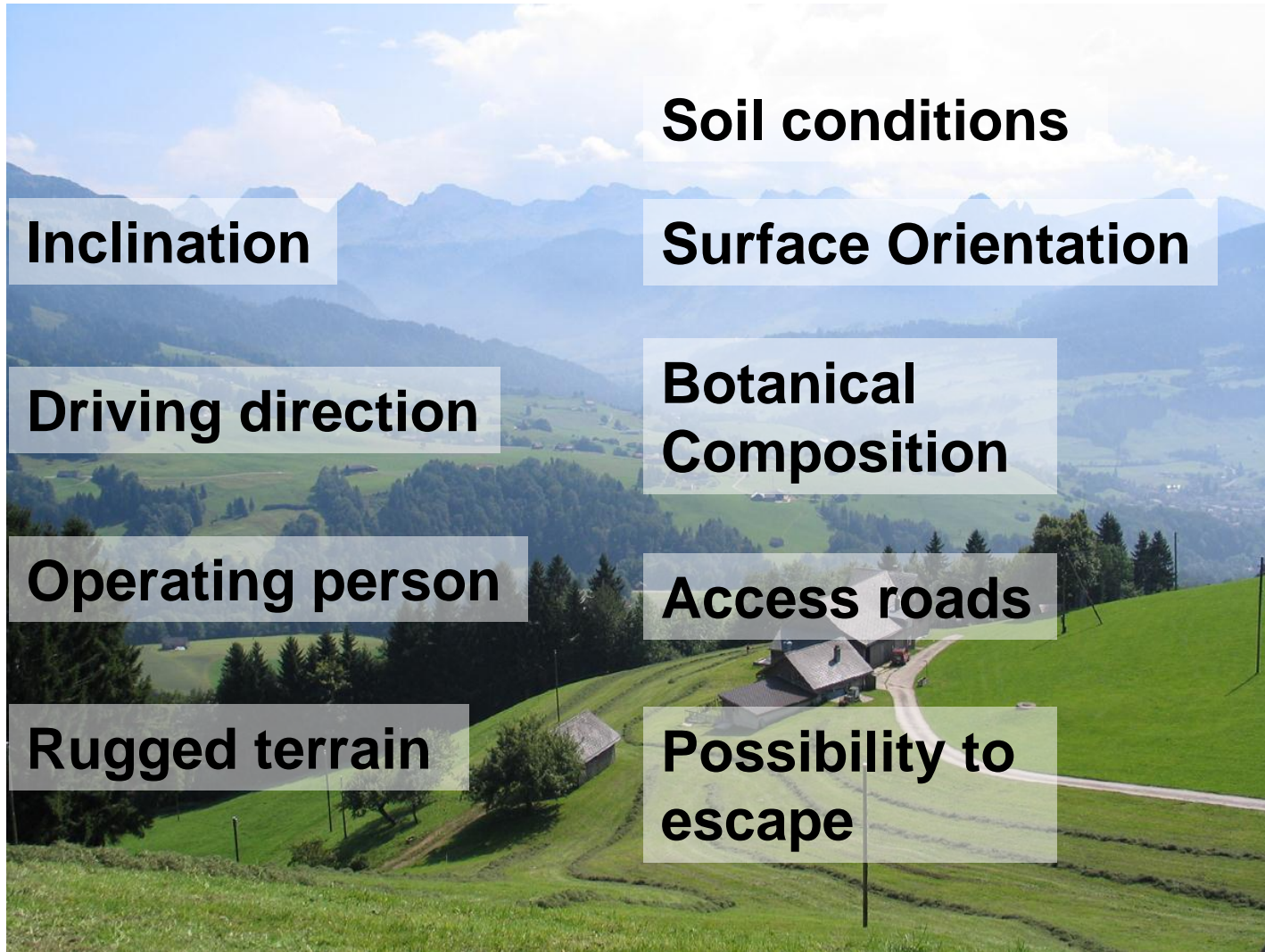
**Interview with farmers
(46 Farms)**

**Determination of inclination
(Measured section of 2 m)**

Recording of technical data

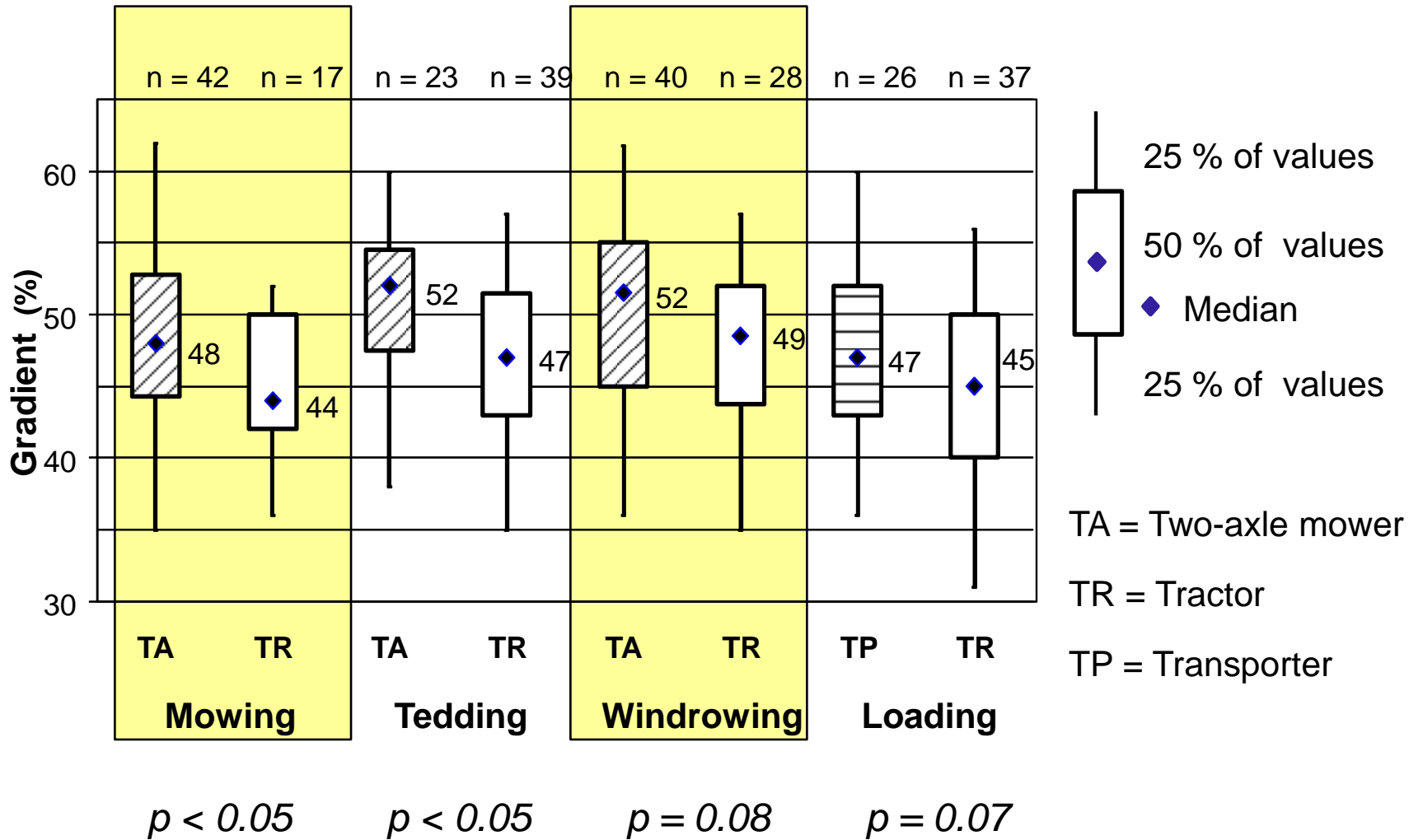


Factors of influence



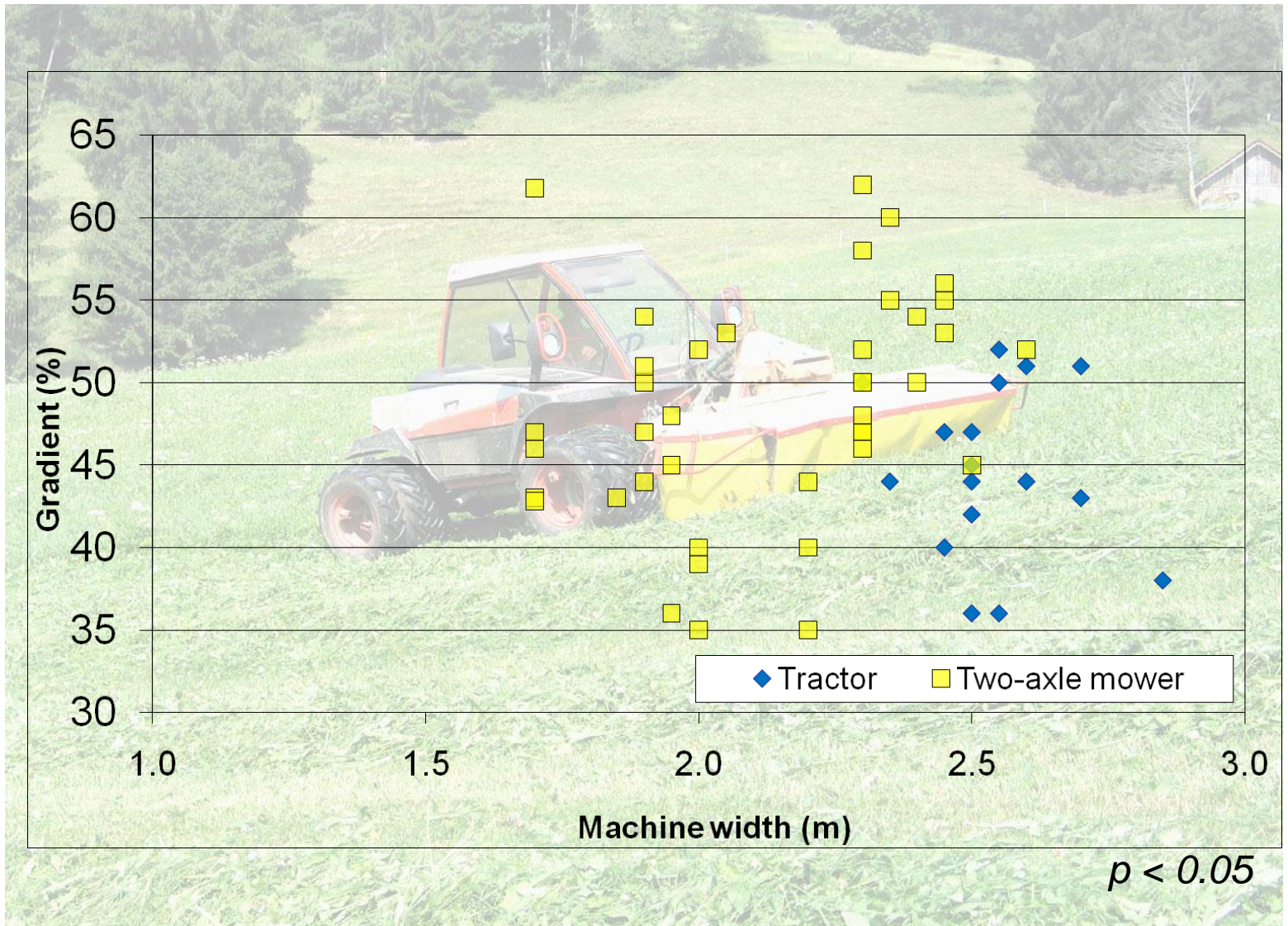


Operating limits





Comparison of machine width





Technical Data (Examples)

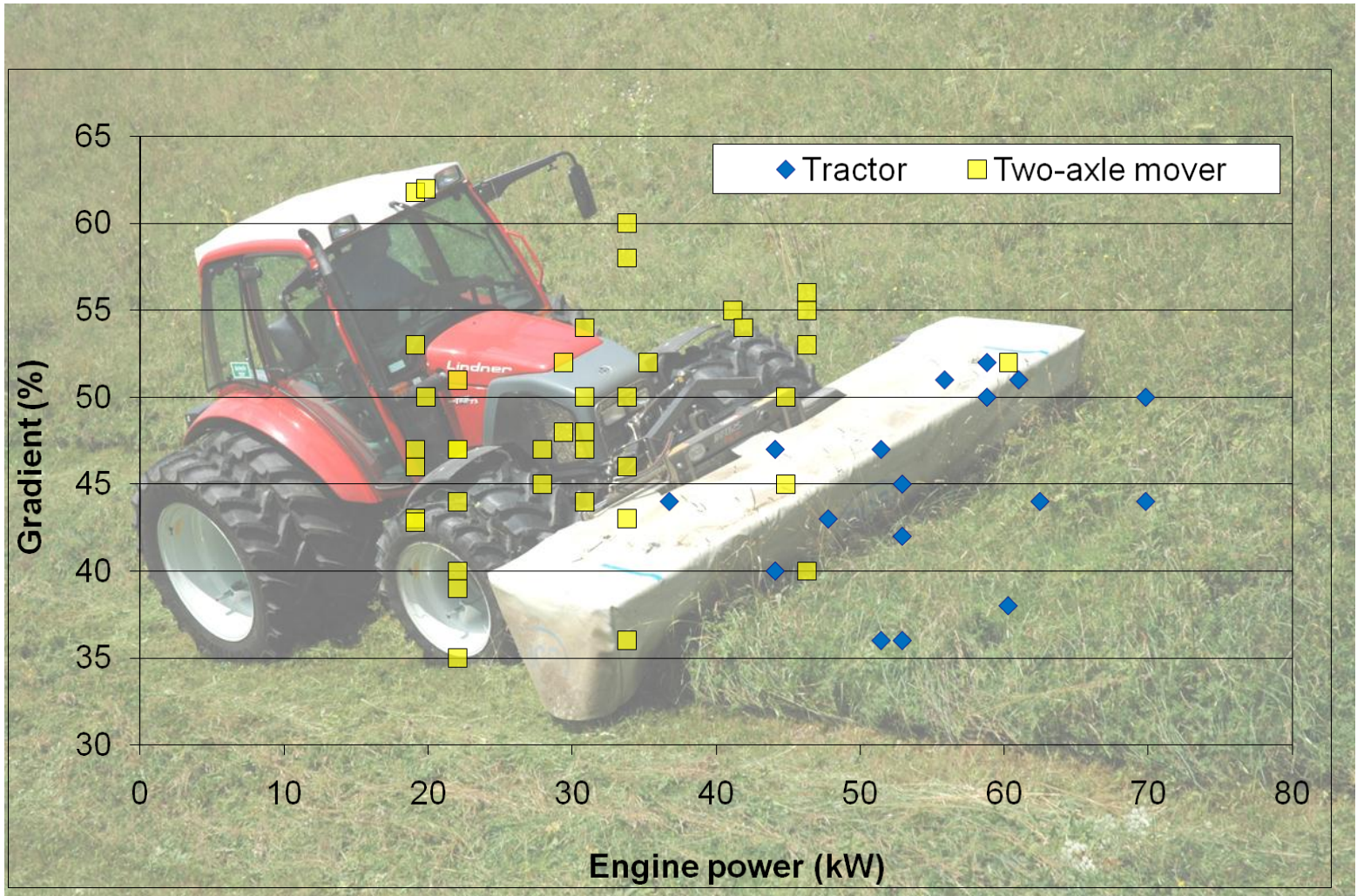


	AEBI Terratrak TT 205	LINDNER Geotrac 65
Engine power kW (HP)	36 kW (50 HP)	48 kW (65 HP)
Weight Empty	1650 kg	2880 kg
Total	2800 kg	4200 kg

Difference = 1230 kg !



Gradient and Engine Power



$p < 0.05$



Conclusions:

- **The use of tractors for cutting is still not common.**
- **Gradient is not the only limiting factor.**
- **Tractors have bigger wheel gauge.**
- **Therefore tractors need cutter bars with bigger working width.**
- **For tedding and windrowing higher gradient can be machined as for cutting (TA-Mower significant).**



Our suggestion in operating limits

→ depend on external factors of influence

	Gradient of operation limit
Single-axle mower	100 %
Two-axle mower	35 – 48 – 62 %
Tractor	35 – 44 – 52 %



Thank you!



**ART – Research for
Agriculture and Nature**

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