
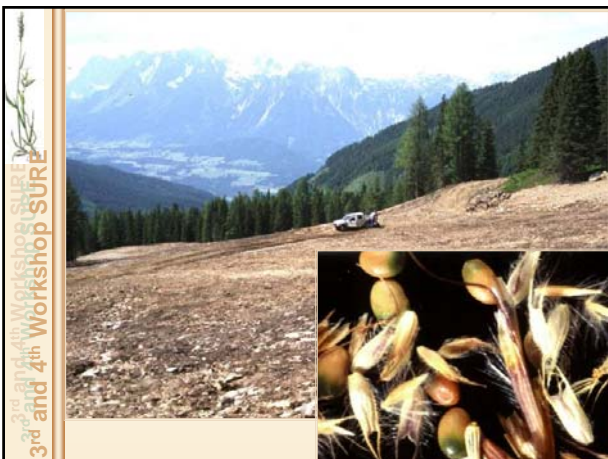


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Evaluation of Slope Renovation in Higher Altitudes

B. KRAUTZER, W. GRAISS & A. BLASCHKA
Roznov pod Radhostem & Banska Bystrica, 2005

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Practical operation with native plant material





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Restoration with seeds

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Site Piancavallo (1.435 m)

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Restoration, application technique and erosion

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Surface runoff and soil losses after restoration

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water flow and losses after restoration

water flow of compared application techniques referring to 500 mm precipitation

Year	Application Technique	Water Flow (l m ⁻²)
1999	hand sowing (commercial mixture)	58
2000	hand sowing	48
2000	hand sowing + nursery grass	44
2000	hand sowing + cover crop oat	43
2001	hand sowing + cover crop oat	32
1999	hand sowing (indigenous mixture)	29
2001	hydroseed	28
1999	hand sowing + straw mat (indigenous mixture)	5
2001	hydroseed + straw mat	2

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water flow and losses after restoration

soil losses of compared application techniques referring to 500 mm precipitation

Year	Application Technique	Soil Losses (g m ⁻² per 500 mm precipitation)
2001	hydroseed	423
2001	hand sowing + cover crop oat	357
2000	hand sowing	171
2000	hand sowing + cover crop oat	165
2000	hand sowing + nursery grass	146
1999	hand sowing (indigenous mixture)	109
1999	hand sowing (commercial mixture)	89
1999	hand sowing + straw mat (indigenous mixture)	4.6
2001	hydroseed + straw mat	1.1

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Restoration and seed mixture

Site St. Anton/Capall (2.350 m)

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Classification of species regarding to their ecological value

- Group 1:** site-specific species, growing naturally under site conditions.
- Group 2:** site-adapted species, not site-specific but sustainable under comparable site conditions.
- Group 3:** non-site-adapted species, naturally not occurring under the specific climatic and site conditions.

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Share of species according to their ecological value

Commercial seed mixture

Site-specific seed mixture

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Fertility of selected species

location	Bayrischzell	Piancavallo	Hochwurzten	Zillertal	St. Anton
altitude	1230	1435	1830	2280	2350
<i>Poa alpina</i>	fertile	fertile	fertile	fertile	fertile
<i>Festuca nigrescens</i>	fertile	fertile	fertile	fertile	fertile
<i>Trifolium badium</i>	fertile	fertile	fertile	fertile	fertile
<i>Trifolium nivale</i>	fertile	fertile	fertile	fertile	not observed
<i>Phleum alpinum</i>	fertile	fertile	fertile	fertile	not observed
<i>Anthyllis vulneraria</i>	fertile	fertile	fertile	not observed	not fertile
<i>Agrostis capillaris</i>	fertile	not fertile	fertile	fertile	not fertile
<i>Phleum pratense</i>	fertile	fertile	fertile	not fertile	not fertile
<i>Lolium perenne</i>	fertile	fertile	fertile	not fertile	not fertile
<i>Trifolium hybridum</i>	fertile	fertile	not fertile	not fertile	not fertile
<i>Trifolium repens</i>	fertile	fertile	not fertile	not fertile	not fertile

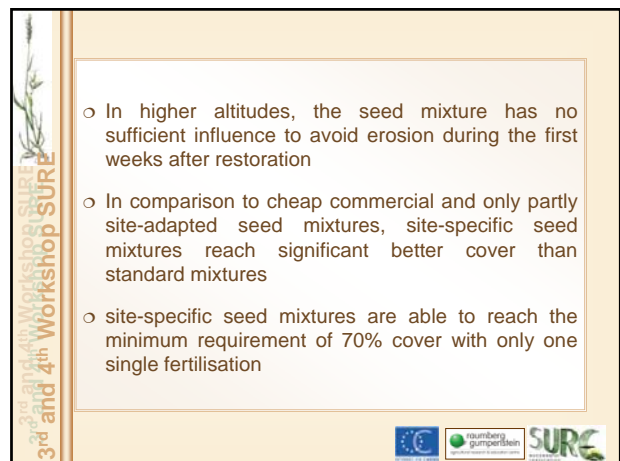
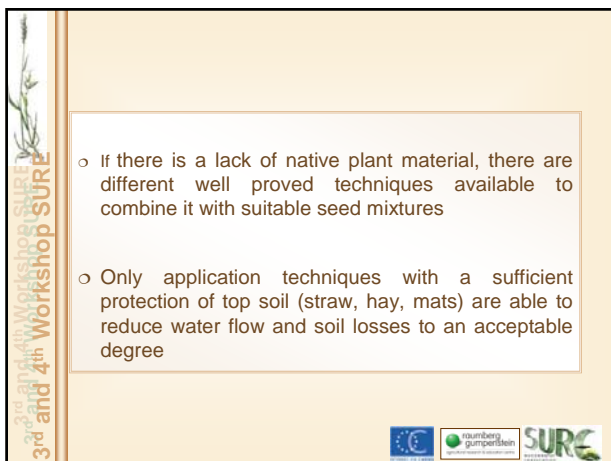
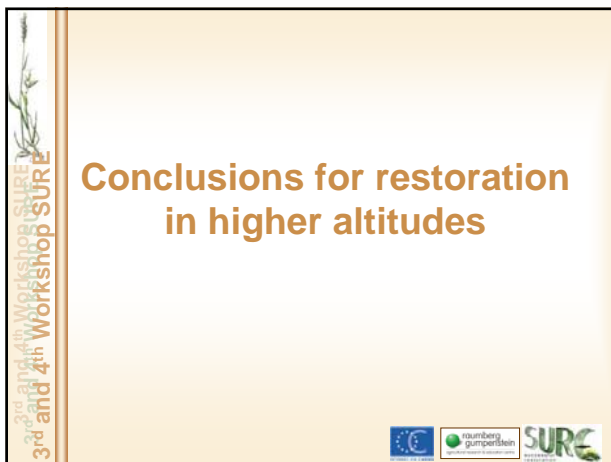
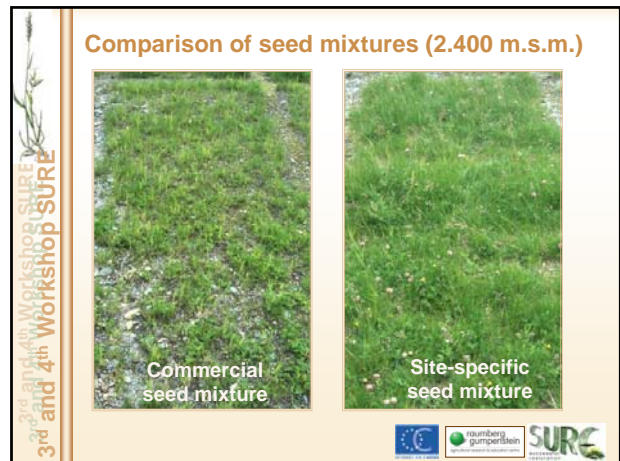
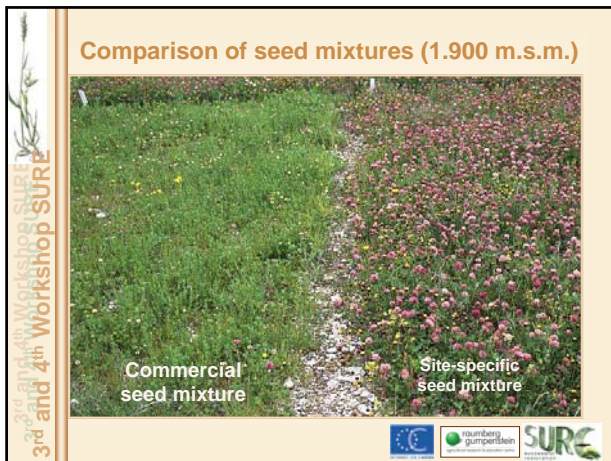
■ fertile
 ■ not fertile
 not observed

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Comparison of seed mixtures (1.600 m.s.m.)




Commercial seed mixture

Site-specific seed mixture



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- In general, a single fertilisation of areas restored with site-specific seed mixtures is sufficient. Under difficult conditions, further fertilisation can be necessary
- The use of site-specific seed mixtures leads to sustainable plant communities and a minimisation of expenses for reseeded, fertilising and cutting
- A positive economic medium-term assessment for ecological restoration methods can be estimated

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Restoration in practice





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Application technique: hydroseeding







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Combined seed – sward process



Fotos: H. Wittmann





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Combination of seeding, geotexts bushlayers and willow weaving



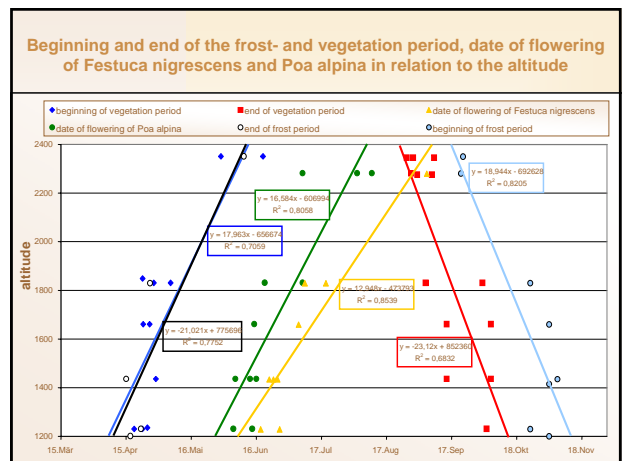








Experimental design of the trials

- Hydrosseed** (white triangle): seeds, gluten, cellulose, mineral fertilizer
- Mycorrhiza** (yellow triangle): hydrosseed plus mycorrhiza-inoculum, compost
- covered top soil** (orange triangle): normal sowing or hydrosseed plus fertilizer plus cover of top soil (straw, hay or mat)
- commercial mixture** (green triangle): 250 kg ha⁻¹ standard mixture of lowland species
- indigenous mixture for further utilisation** (light green triangle): 150 kg ha⁻¹ indigenous species, composed for each site
- indigenous mixture without further utilisation** (dark green triangle): 150 kg ha⁻¹ indigenous species, composed for each site

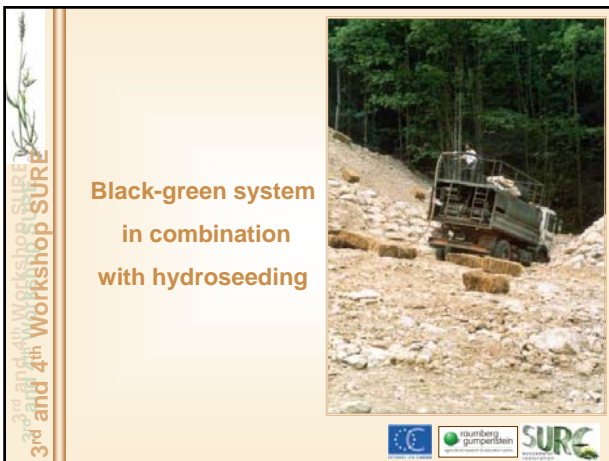


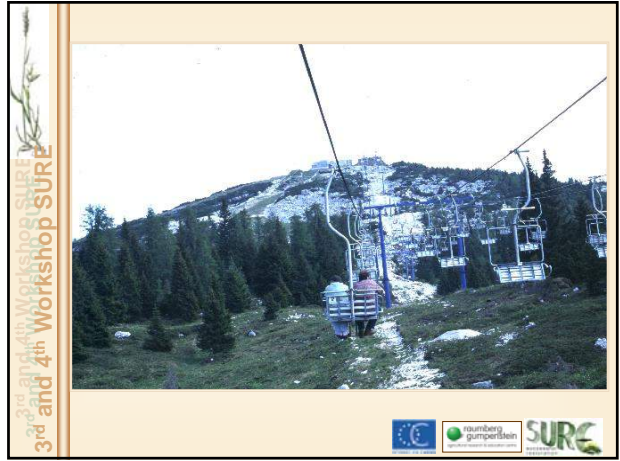
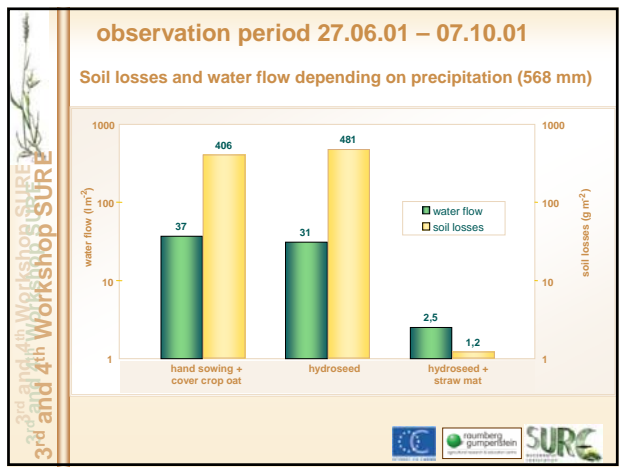
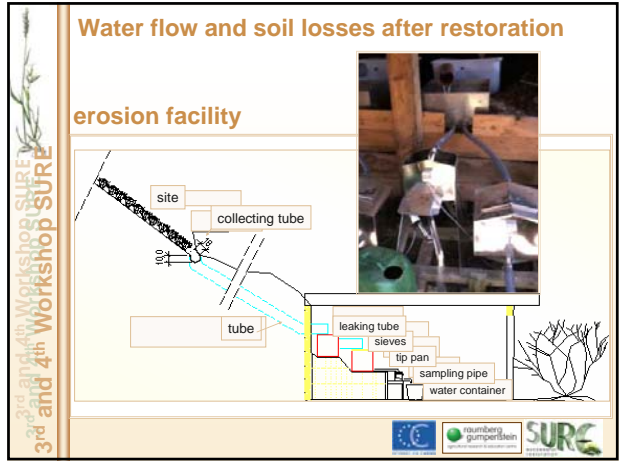
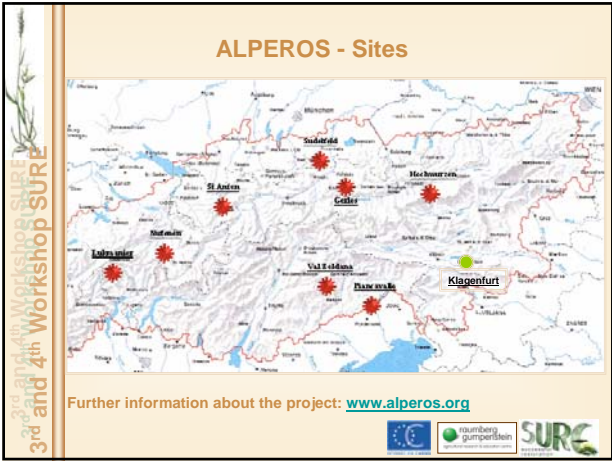


EU project Alperos, general results

site-specific versus commercial seed mixtures	site specific seed mixtures	commercial seed mixtures
protection against erosion	+	-
persistence of vegetation	+	-
tolerance against: climate	+	-
utilisation	+	+/-
maintenance measures	+	-
ecological value	+	-
seed rate kg ha ⁻¹	80-150	200-400
average price in Euro per kg (excl. VAT)	12,20	3,97
average price of seed mixture per ha in Euro	1.400,-	1.200,-

+ = desirable characteristic





Restoration with sod clippings

