The use of hayseed for environmental recovery in the Orobie Bergamasche natural park, Italy.

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Samples contained a mear

of **580 seeds per gram** 35% of the hayseed

mixture consisted of seeds

and 65% hay.





Hayseed (derived from dried hay or collected using a brush-harvester from donor grasslands) has previously been employed for environmental engineering and recovery in Switzerland, Austria and the United Kingdom.

Project RISPOSta (RESPONSE) aims to respond to degradation of high altitude grasslands using hayseed collected from high biodiversity vegetation in protected areas.

In the Orobie Bergamasche park, in the southern Alps, several ski pistes have recently been constructed, some illegally, in areas of great scientific and conservation interest. A specific aim of the project is to compensate for these disturbances by re-vegetating in a way that maintains the original biodiversity of the affected areas.

PHASE 1: hayseed collection at different altitudes from 'donor' grasslands with different floras

At each donor site phytosociological surveys were conducted to characterize plant biodiversity and compare this between sites (Rusconi, 2010). In the summer of 2009 a total of over 330 kg of hayseed was collected. Hayseed was mostly separated from the hay by sieving. The hay, which also contains a discrete amount of fine seeds, brings the total material collected to 480 kg.



Artavaggio (Lecco) Pasture dominated by Deschampsia caespitosa Fogarolo (Bergamo) Dry meadow dominated by Bromus erectus

Pirolo (Bergamo) Nitrophilous grassland Arrhenatherum elatius

PHASE 2: hayseed characterization

- For hayseed collected in 2009 the following measurements were taken (Urania, 2010): number of seeds per unit weight;
- purity (proportion of hayseed existing as seeds or as waste material);
- germination rate (tests in growth chambers, in the greenhouse and in the field).

Thanks to a photographic archive made during the project the seeds present in the hayseed samples were identified to the level of family, genus and (where possible) species, from which it was possible to determine which species were present.

Counting the seedlings that emerged after germination (mean = **~350 seedlings/g**) allowed the calculation of the optimum sowing density (~30 g/m²) to guarantee the presence of 10,000 seedlings per m² in the vegetation created (Florineth, 2007).

PHASE 3: experimental hydroseeding and hand-strewing.



In September 2009, at Monte Pora (1610 m a.s.l.), experimental hydroseeding was conducted to compare the efficacy of hayseed (collected in 2008; Vecchiato, 2009) and a commercially-available seed mixture (**ReNatura Alpin**, from Scheier Italia). The hayseed was sown at three different densities (**65**, **130** and **195** g/m^2).

Seedling density was quantified periodically using 15 cm quadrats. By the following spring many seedlings had disappeared, but vegetation cover was nonetheless high.

335 days after sowing there was no statistically significant difference in the number of seedlings between the commercial seed mixture and the highest density of hayseed (**195** g/m²) (Baesso, 2010).

In July 2010, at the ski piste "Pista del Sole di Lizzola" (1680 m a.s.l.), handstrewing of hayseed onto a layer of straw was undertaken using hayseed collected in 2009 (Urania, 2010).

The hayseed was strewn with a density of approximately **35** g/m^2 , and was integrated with the addition of the commercial seed mixture **ReNatura Alpin** (approximately 7 g/m^2).

Data concerning seedling densities are still not available, but in the photo on the far right, below (a detail form the area of intervention 30 days after sowing), the emergence of the first seedlings is visible.





References

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