

# CHARACTERISATION OF BRUSH-HARVESTED HAYSEED QUALITY (PURITY, SEED CONTENT AND GERMINATION) FOR THE CALCULATION OF OPTIMAL SOWING DENSITIES



centroflora@parcobarro.it



Roberta M. CERIANI<sup>1</sup>, Simon PIERCE<sup>2</sup>, Andrea FERRARIO<sup>1,3</sup>, Mauro VILLA<sup>1</sup>,  
Marco CACCIANIGA<sup>4</sup>, Bruno E.L. CERABOLINI<sup>5</sup>

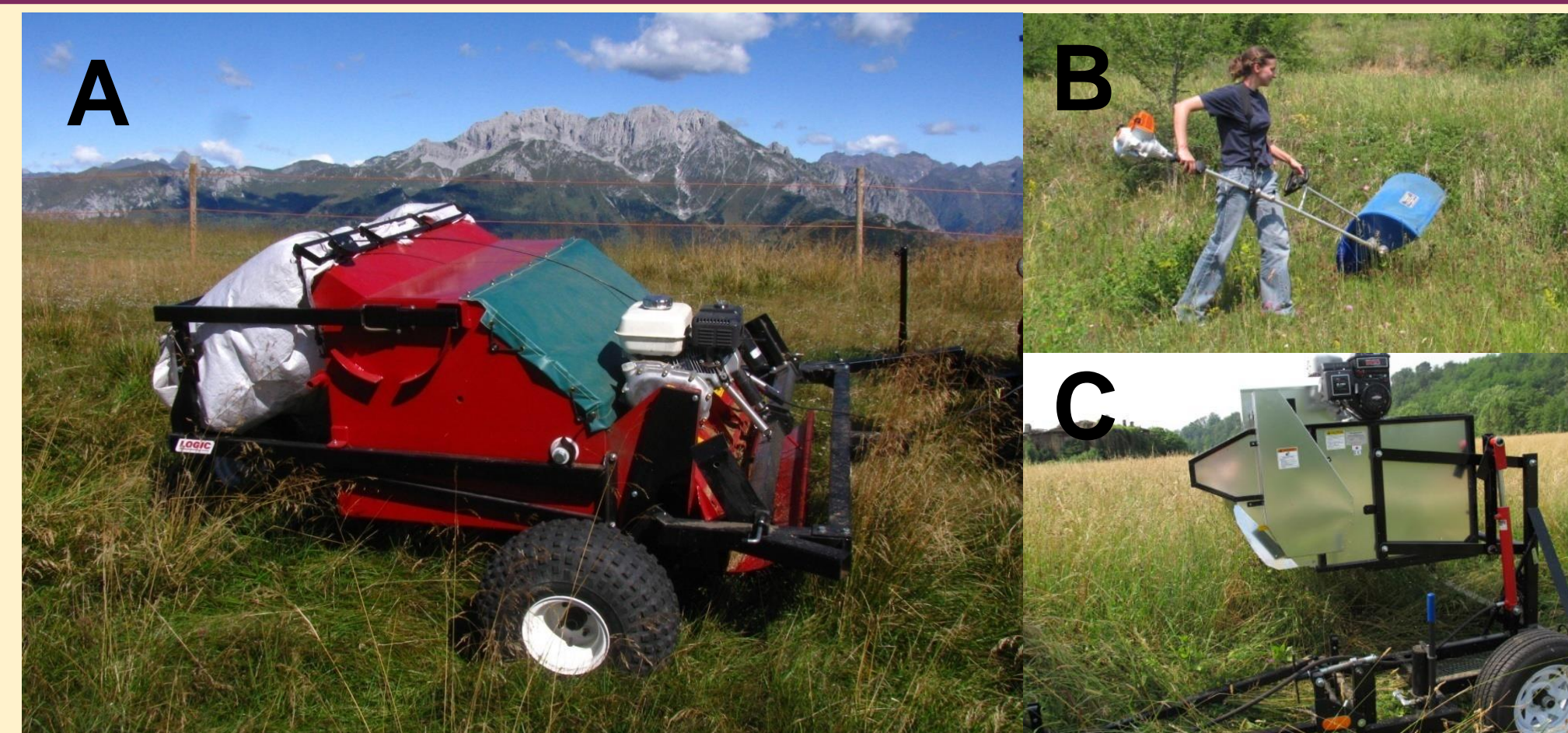
<sup>1</sup> The Native Flora Centre (Centro Flora Autoctona; CFA), c/o Consorzio Parco Monte Barro, via Bertarelli 11, I-23851 Galbiate (LC), Italy; <sup>2</sup> Department of Agricultural and Environmental Sciences (DiSAA), University of Milan, Via G. Celoria 2, I-20133 Milan, Italy; <sup>3</sup> Studio F.A. Natura, via Fagnana 3/C, 22078 Turate (CO), Italy; <sup>4</sup> Department of Biosciences, University of Milan, Via G. Celoria 26, I-20133 Milan, Italy; <sup>5</sup> Department of Theoretical and Applied Sciences, University of Insubria, Via J.H. Dunant 3, I-21100 Varese, Italy.

## Background

Several projects demonstrate the utility of hayseed for ecological restoration, but how hayseed should be employed remains ambiguous as no standard procedure currently exists for hayseed characterisation. In Europe an absence of guidelines partly reflects the lack of a requirement by EC Directive 2010/60/EU for specific data quality parameters for directly harvested seed mixtures. However, the Directive states that directly harvested seed mixtures should be appropriate for restoration of each given habitat, and a density of 8000 established seedlings m<sup>-2</sup> has been shown as a requirement for successful revegetation in alpine grasslands (Florineth 2007). We developed a method for the standardised characterisation of hayseed lots to allow labelling of recommended sowing densities for hayseed from different grassland types, inspired by the quality tests usually applied to commercial seed (such as those of the International Seed Testing Association; ISTA 2017).

## Methods

Hayseed was collected from 49 grassland donor sites in Lombardy, northern Italy, using three different types of brush harvester, and characterised in terms of purity (seed:inert plant material), seed content (number of seeds per unit hayseed weight) and germination capacity (density of seedlings emerging over a given area). Hayseed was also used for restoration and restored areas monitored in terms of seedling density and cover.



The three types of brush harvester used in the study: (A) the 'English' type (model MSH 120; Logic Manufacturing Ltd.) suitable for use on slopes, (B) the Hand Held Seed Harvester (Prairie Habitats Inc.) for uneven ground, and (C) the 'Canadian' Pulltype Seed Harvester (Prairie Habitats Inc.) for tall grasslands. Photos: Andrea Ferrario.

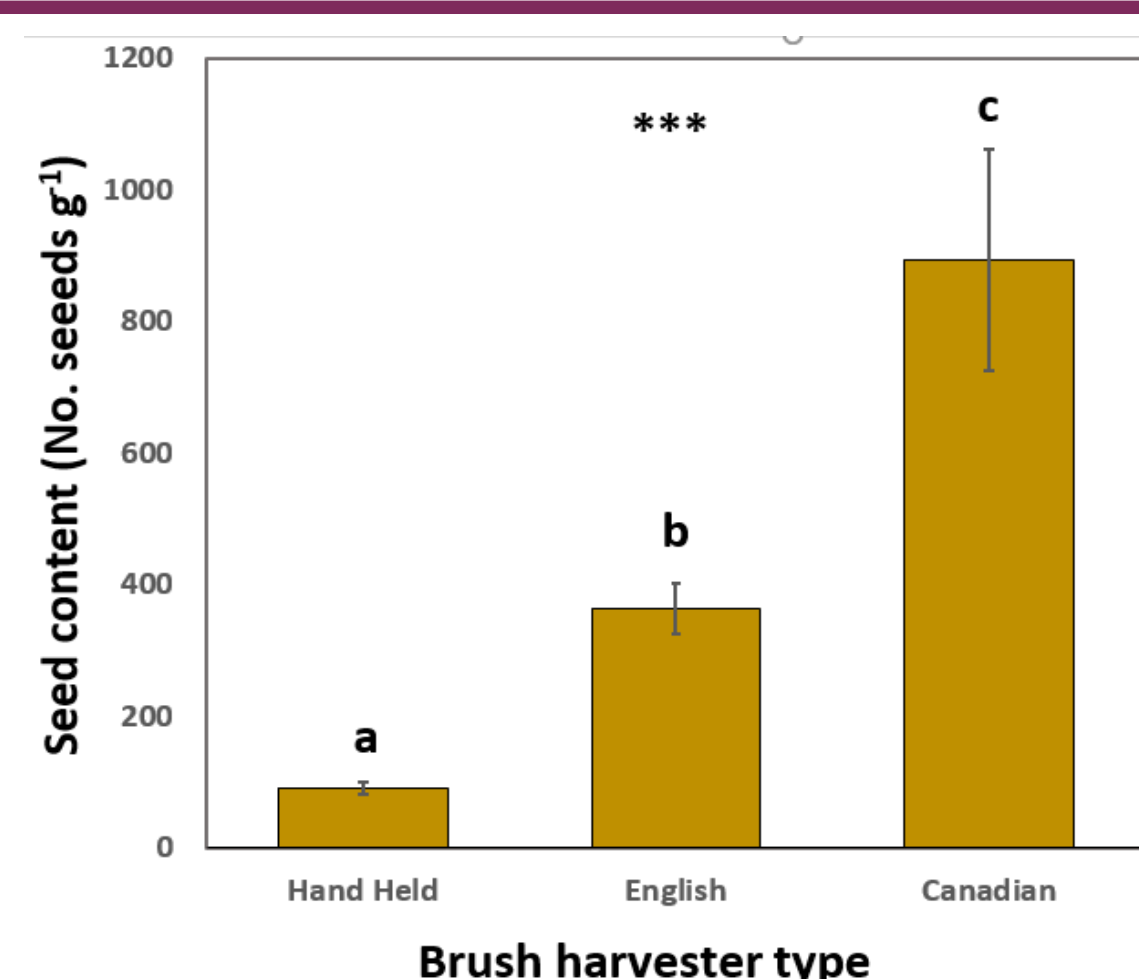
## Yield

The mean yield across all donor sites was 60.6 kg ha<sup>-1</sup> (min./max. 19.6 to 131.8 kg ha<sup>-1</sup>).



## Seed content

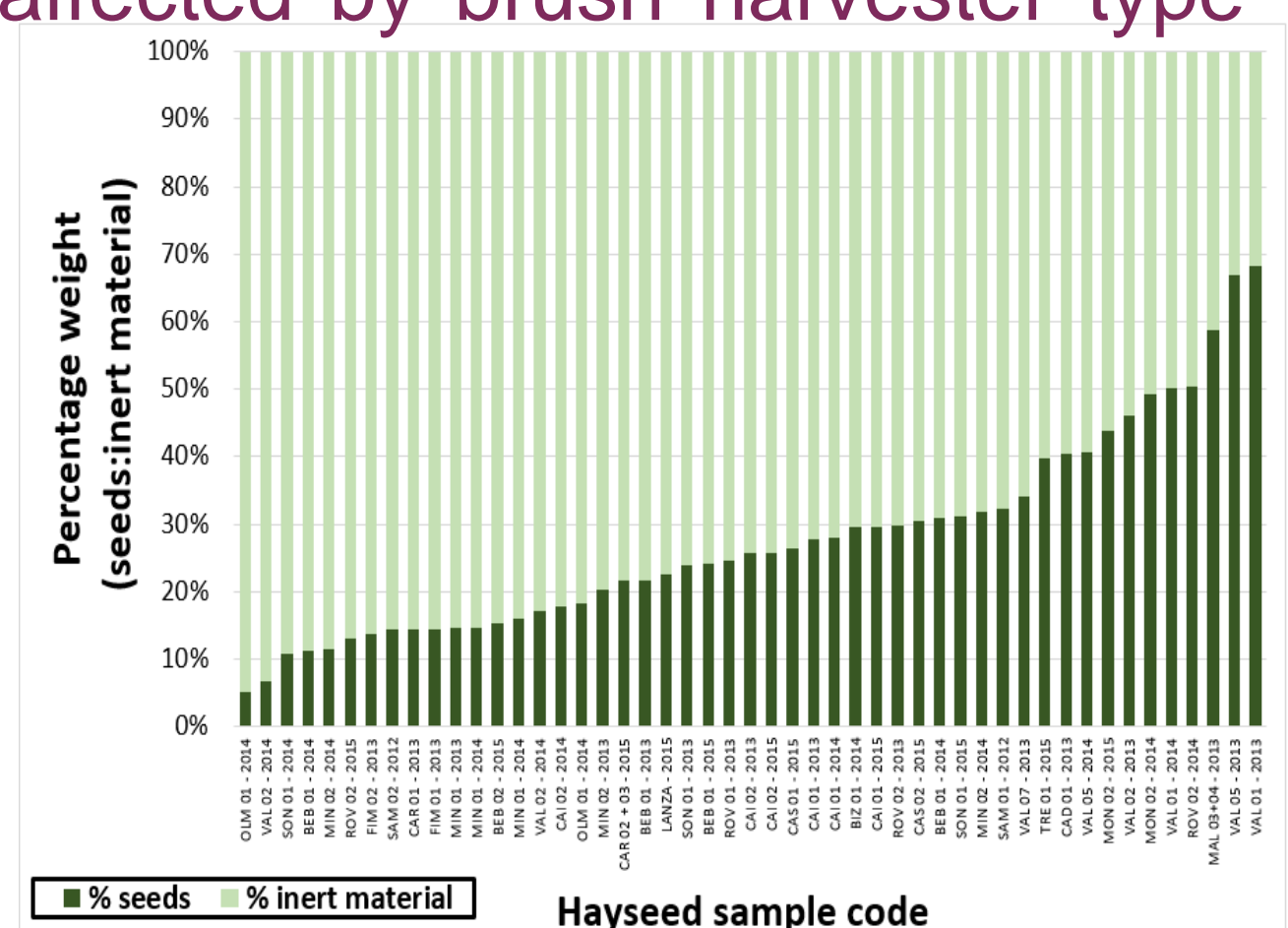
Seed content exhibited a mean of 536.5 seeds g<sup>-1</sup>, ranging from 82.4 to 2635.0 seeds g<sup>-1</sup>, and differed between brush harvester types.



## Purity

The mean purity across sites was 28% seed, ranging from 5 to 68%, and was also affected by brush harvester type ( $p < 0.05$ ; data not shown).

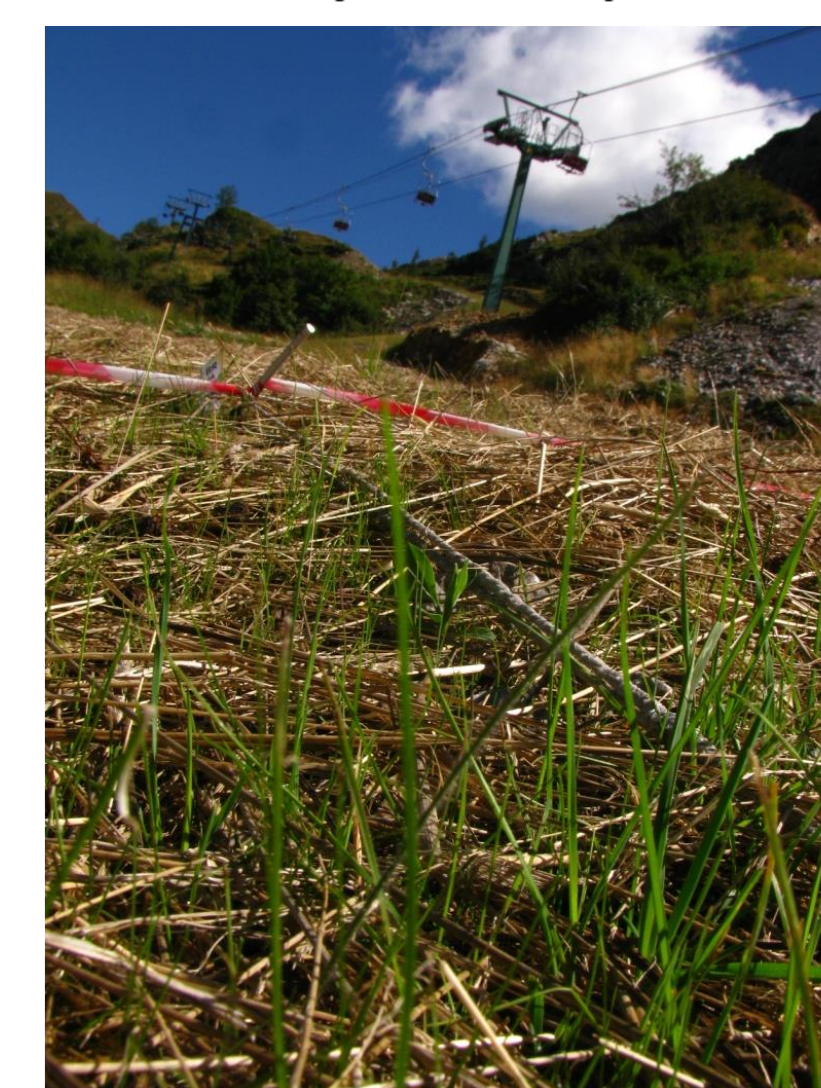
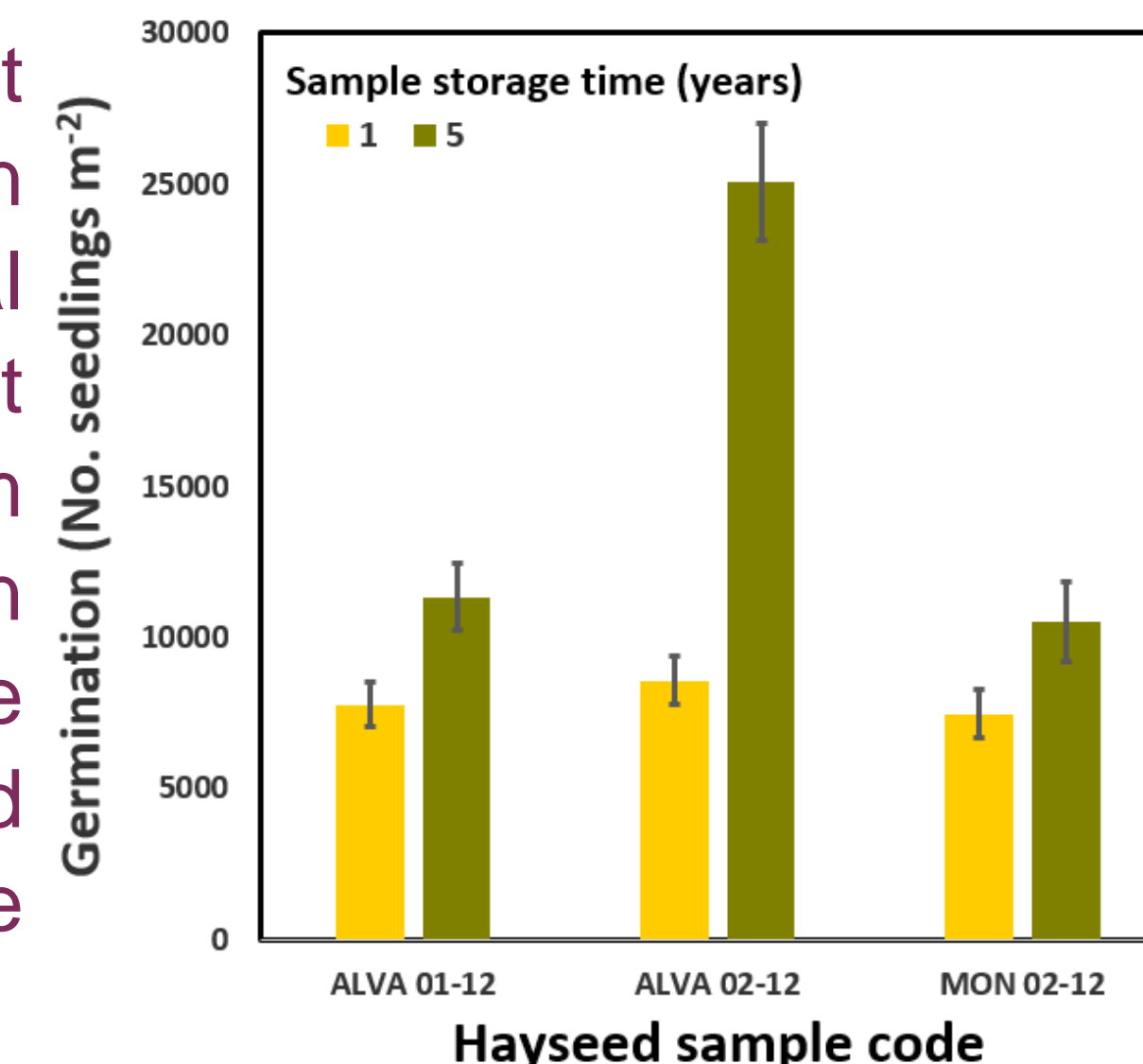
Please note that inert plant material is also a useful component of the hayseed mixture for the hydro-seeding process.



## Germination and establishment

Mean germinability was 7000 seedlings m<sup>-2</sup> (at 30d from sowing). Recent tests conducted on sub-lots of hayseed preserved for several years (3, 4 or 5), demonstrate a significant increase in germination during short term storage (figure, right, shows germination differences in the first and fifth years for three hayseed lots): similar effects have been noted for single species of Poaceae (e.g. Shidaee *et al.* 1969).

During revegetation trials (photo, right), complete soil cover was generally achieved after three months, associated with declining seedling density due to shifts in competitive dominance. Monitoring of sites over several years shows the progressive and spontaneous ingress of other species from surrounding vegetation, leading to floristic enrichment and development of the grassland.



## Optimal sowing densities

Optimal sowing density for each hayseed lot ranged between 5 and 94 g of hayseed per m<sup>2</sup>: values for most lots were below the sowing densities for commercial seed mixtures advised by ERSF (2001) for establishment of vegetation for erosion control (30 to 50 g m<sup>2</sup>).

## Conclusions

Standardised characterisation of hayseed lot quality is possible in a way that allows sowing density recommendations and labelling to be carried out for each type of donor grassland.

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## Literature cited

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