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A new method and integrated approach for sustainable management of animal manure and slurry in alpine ecosystems.

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Background & Objectives

Alpine economy thrives on tourism and animal husbandry. Dairy cows diet includes the hay obtained from permanent meadows; the milk is processed into PDO cheeses. Anaerobic digestion represents the solution for a proper management of animal waste but a tailor made use of digestate is necessary to maintain the meadows biodiversity, a fundamental element of alpine environment and landscape [1].

Materials & Methods

The dossiers of all the farms involved in the AD plant were collected. Biochemical methane potential (BMP) as well as chemical parameters were assessed on manure and slurry. Data were managed using a geographic information system (GIS). This approach allows the integration of the original sources with both existing layers (slope map, soil map, restricted area where the spreading of livestock waste is not allowed) and new informative layers developed for the study (different macro-areas grassland, botanical-management, type of grass).

Results & Discussion

More than 70% of the considered meadows has a slope > 10% stated as national limit for spreading animal slurry and digestate. The mapping of meadows included botanical and management characterization on more than 500 ha and it was aimed at dividing them in three categories: 1) species rich meadows: at field botanical and agronomic characterization; 2) valley bottom meadows: characterization by altitude and slope; 3) sloping meadows: not in 1 & 2. The critical slope threshold was determined using the Runoff Curve Number, developed by the USDA Natural Resources Conservation Services [2] and using the method proposed by Hawkins et al. [3] for the calculation of the effective precipitation, fixing the threshold slope at 40%. The final step is the definition of suitability maps for each farm indicating doses and modalities of using digestate in order to avoid runoff and leaching of nutrients.

Conclusion

The method proposed permits to the farms operating in alpine valleys to plan the use of digestate on meadows up to 40% of slope and up to the max dose 40m³/ha without runoff, with positive effects on the quality of meadows (biodiversity) and the amount of forage produced.

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