
by

Helmut Döhler
DöhlerAgrar, Untermerzbach

Martin Kaupenjohann
Technische Universität Berlin, Fachgebiet Bodenkunde, Berlin

Urs Schmidhalter
Technische Universität München, Fachgebiet Pflanzenernährung, Freising

scientific committee:

Heinz Flessa
Thünen Institute of Climate-Smart Agriculture, Braunschweig

Fabrizio Gioelli
Department of Agricultural, Forest and Food Sciences (DISAFA), University of Torino, Grugliasco (To), Italy

Sven G. Sommer
University of Southern Denmark (SDU), Faculty of Engineering, Institute of Chemical Engineering, Biotechnology and Environmental Technology, Odense M, Denmark

Gerard L. Velthof
Wageningen Environmental Research, Wageningen University and Research, Wageningen, The Netherlands

Compilation:

Frederick Büks
Technische Universität Berlin, Fachgebiet Bodenkunde, Berlin

Susanne Döhler
DöhlerAgrar, Untermerzbach

On behalf of the German Environment Agency
Static and ventilated chamber methods for the measurement of ammonia and N\textsubscript{2}O emission: pros, cons and applications

Fabrizio Gioelli\textsuperscript{1}, Elio Dinuccio\textsuperscript{1}, Paolo Balsari\textsuperscript{1}

\textsuperscript{1)Department of Agricultural, Forest and Food Sciences (DISAFA), University of Torino, Largo Paolo Braccini 2, 10095 Grugliasco (To) (Italy)

Corresponding author: fabrizio.gioelli@unito.it

The agricultural sector (namely animal husbandry and nitrogen fertilizers application) is responsible of up to 94% of global ammonia (NH\textsubscript{3}) and approximately 5% nitrous oxide (N\textsubscript{2}O) EU-28 emission (Eurostat, 2010). Thus, the sector poses serious risks to the environment. The range of approaches to the problem of measuring emission rates of nitrogen (ammonia and nitrous oxide) either from livestock sector and chemical fertilizers is wide, whereas the range of available techniques for measuring ammonia concentrations and/or ammonia flux rates in air is even wider. Due to the necessity to measure emission with a good level of accuracy it’s necessary to use robust methods, defined as methods which are able to measure emission fluxes to within acceptable levels of accuracy and precision, using techniques which do not require a high level of operator skill and are sufficiently portable that can be shown to function acceptably in real farm situation (Phillips et al., 2000). Moreover, the methods to be used shall allow emission measurements over time-periods from 1h upwards to 24+ hours. Nitrogen emission are influenced by several environmental and managing factors (e.g. temperature, wind speed, soil humidity, application methods), thus measuring systems shall not alter climatic conditions or shall allow to reproduce them. According to international literature when different measurement systems are used of quantify nitrogen fluxes from the same emitting source, very often final results differ significantly. Hence, standard methods for measuring emission are needed to guide research on abatement strategies and to produce international inventories.

Static and ventilated chambers are widely used to quantify nitrogen emission, nevertheless their field of application is related to the type of nitrogen flux (either ammonia or nitrous oxide) that has to be measured and to the final goal of the measurement (e.g. the need to get relative or absolute emission values). The presentation provides an overview of the possible fields of application of both systems and of their points of weakness and strength.