What is the best proportion of Forage peanut and Marandu grass to reduce N_2O emissions?

Abmael da Silva Cardoso[1], Darlan de Jesus Marcelino[2], Robert Michael Boddey[3], Andressa Scholz Berça[1], Ricardo Andrade Reis[1], Ana Cláudia Ruggieri[1]

[1]Departamento de Zootecnia da Universidade Estadual Paulista "Júlio de Mesquita Filho", UNESP, Jaboticabal, São Paulo, Brazil

[2]Departamento de Agronomia da Universidade do Estado da Bahia, UESB, Euclides da Cunha, Bahia, Brazil

[3]Embrapa Agrobiologia, Seropédica, Rio de Janeiro, Brazil Corresponding author. E-mail: abmael.cardoso@unesp.br

Inclusion of legumes in grassland has been found to be environmentally and economically beneficial for ranchers by providing more sustained forage for cattle. However, data on the impacts of proportion of legumes inclusion on nitrous oxide (N_2O) emissions are lacking. The goal of this stay was to evaluate effects of legume (*Arachi Pintoi cv. mandobi*) and grass (*Urochloa brizantha cv. marandu*) mixture on N_2O emissions. Treatments were 5 proportion of legume-grass: 100:0, 75:25, 50:50, 25:75 and 0:100 in a completely randomized design with 5 repetitions. We quantified N_2O emissions using static closed chamber methodology and gas chromatography. A strong effect of legume grass proportion was observed on N_2O emissions. The greatest emissions occurred in the 100% of grass litter (62.4 mg N_2O $plot^{-1}$), while the emissions from 100% legumes were 23.3 mg N_2O $plot^{-1}$. The inclusion of legume litter decreased N_2O emissions in all mixed treatment and the lowest N_2O emissions were found in the treatment 50:50 legume:grass that were similar to 25:75. Probably the low C and N ratio is driving the N_2O losses. Previous studies have been showed that the proportion of Forage peanut with Marandu grass for animal performance range from 30-50% of legumes. Our results showed that the most beneficial proportion of the legumes to mitigate N_2O emissions are in line with that is most beneficial for forage and animal production. Further studies are required to assess leaching and ammonia losses and to do a complete assessment of sustainability in terms of environmental impact.

Keywords: consorciation, N pollution, N_2O mitigation, forage management

Acknowledgments: We thanks the Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP) for financial suporte (#2015/16631-5; #2017/11274-5), Conselho Nacional de Desenvolvimento Tecnológico e Científico (CNPq) and the Coordenação de aperfeiçoamento pessoal de nível superior (CAPES) for the scholarships.