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Straw management and greenhouse gas emissions in sugarcane cropping in São Paulo State, Brazil

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Greenhouse gas emissions during the cropping would consolidate or derail the biofuels as an environmental commodity, mainly due to N2O emissions from fertilizers. It occurs because the Greenhouse Gas Potential of N2O is 298 times greater than CO_2; thus, the range among the balance favorable or not is very close. Since in São Paulo State the sugarcane harvest has been changed from burned to no-burned form due to environmental and social factors, the straw is maintained in the field. However, primarily because straw changes carbon, nitrogen and water availability, we hypothesized that straw influences N2O emissions from soil. At this work, our aim is to determine the amount of applied fertilizer emitted as N2O in sugarcane crop with different levels of straw maintained in the field. The experiment was installed in October 2011 in a commercial area in São Paulo State, which is the principal producer in Brazil (22º22' S, 47º30'W). It is conducted in four blocks with four plots (12x15m) each with the treatments 0; 50; 75; 100% of produced straw by the crop maintained in the field. Nitrogen fertilizer was applied at line as ammonium nitrate (100 kg N ha-1) in all plots. Subplots were included with no nitrogen fertilizer for determination of background emissions. For gas efflux determination is adopted the chamber-based method, where is used the linear regression based on the curve generated from the four gas values measured along the 30 min intervals. The gas measurements are taken at fertilizer line and in between-row position. Inside the chambers (30 cm diameter) were placed the respective amount of straw (by area) and fertilizer (by length). We adopt high frequency of gas samplings to avoid quantification errors from seasonality. Among October and December the samplings are done in alternated days because we are waiting the peak emissions in this period as well as verify in other works. After December, the samplings interval will decrease progressively until once by month. Key periods as isolated rainy events in dry season will be comprise with more intensity of samplings. Concomitant with gas measurements we determine soil moisture, temperature and mineral nitrogen content in soil for subsidize models of emission and support gas emission. If more straw coincides with more N2O emissions, it will incentives activities which aims turn enable the use of part of sugarcane straw as a byproduct for energetic use. In addition, because frequency of sampling is considered a lack in greenhouse gas emissions determination, we expect that this work would be a tool for regional and national greenhouse gas emissions inventories.