Research Regarding the Carbon Balance in Agricultural Farms

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The aim of this study was to assess the carbon balance in an agricultural farm, with the aim of establishing the share of returned carbon to the atmosphere. Often accused of being responsible for pollution, agriculture was placed in second place with a weight of 24-30% of total carbon emissions. However, the agricultural activity by its specificity has the ability to capture a large part of the carbon produced (both directly and indirectly), compared to other domains such as transport, construction or the energy sector (based on fossil consumables) which do not have this capacity, the entire amount of carbon generated being eliminated in the atmosphere.

In this respect, 9 fodder crops were investigated, which constitute the fodder base for an average herd of 800 Simmental dairy cows. The amounts of raw carbon fixed by photosynthesis above and below ground, the amounts of raw carbon eliminated in the atmosphere by the physiological processes of plants, as well as the net amounts of carbon fixed by plants were evaluated.

The average proportion of net carbon fixed by plants was 75.6% (19460 kg CO2 eq/ha), only 24.4% (6306 kg CO2 eq/ha) of the total amount of carbon was removed as a carbon footprint. Of the total of 75.6% of net fixed carbon, 37% (7200 kg CO2 eq/ha) was fixed underground, without a determining role in establishing the carbon footprint. The study highlighted that the straw plants release into the atmosphere between 13.7% (3455 kg CO2 eq/ha) for the wheat crop and 21% (4531 kg CO2 eq/ha) for the barley crop of the total fixed raw carbon. By comparison, the corn crop, according to its destination, release 19% (2236 kg CO2 eq/ha) for the grain crop and 21.6% (2404 kg CO2 eq/ha) for the silage crop. Alfalfa release 26% (13015 kg CO2 eq/ha) of the total carbon, but it should be mentioned that due to the developed root system 65% (8459 kg CO2 eq/ha) of the total carbon is fixed above ground and therefore immobilized. Perennial grasses remove the largest share of carbon, 28% (10464 kg CO2 eq/ha), a fact for which the reduction of this percentage can be done through mixed cultivation with alfalfa. The studies highlighted a significant reduction ($p \leq 0.05$) in terms of the amount of carbon eliminated up to the threshold of 23% (9940 kg CO2 eq/ha).

The amount of net sequestered C in the soil exerts a significant role on the efficiency of the farm's activity, given that each ton of sequestered carbon represents a carbon credit, at a current average price of around 65 euros/credit.

In conclusion, agriculture allows the release into the atmosphere of an average percentage of 24% of the total amount of associated carbon, a condition in which it cannot be considered a real threat compared to domains such as transport or construction or some branches of industry.

Keywords: agriculture, carbon, crops, farms, pollution

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