

Summary: BioAgenasol® trial of the Styrian Chamber of Agriculture – Risk of nitrate discharge in sensitive groundwater areas



In 2016, the Styrian Chamber of Agriculture had already initiated a trial study with oil pumpkins to assess the performance and behaviour of the organic fertiliser BioAgenasol® in sensitive groundwater areas. The 2017 trial examined how BAS behaves on horticultural acreage with regard to the risk of nitrate discharge into groundwater compared to a mineral-based compound fertiliser variant. For this purpose, a trial with lettuce – mainly Grazer Krauthäupln – was set up in 2017, and in 2018 early potatoes were planted on the same trial area. To corroborate results from other trials held over recent years, the trial was repeated with grain maize on the same area in 2019.

The trial field is located in the Grazer Feld (district of Graz-Umgebung / suburbs of Graz) in designated area 2 for groundwater protection programme. The soil type is loamy sand, a medium to deep carbonate-free brown earth. At a depth of 55–70 cm, one encounters sand, gravel, and crushed stones. For the measurement of the nitrate discharge, lysimeter measuring points and several suction cups were available.

Precipitation levels in 2019 were below average. Only in certain months did rainfall reach its long-term average. The hot summer months from June to August saw a precipitation deficit of 40 percent. However, due to the good distribution of rainfall, there was no drought damage on this trial site with light soil.

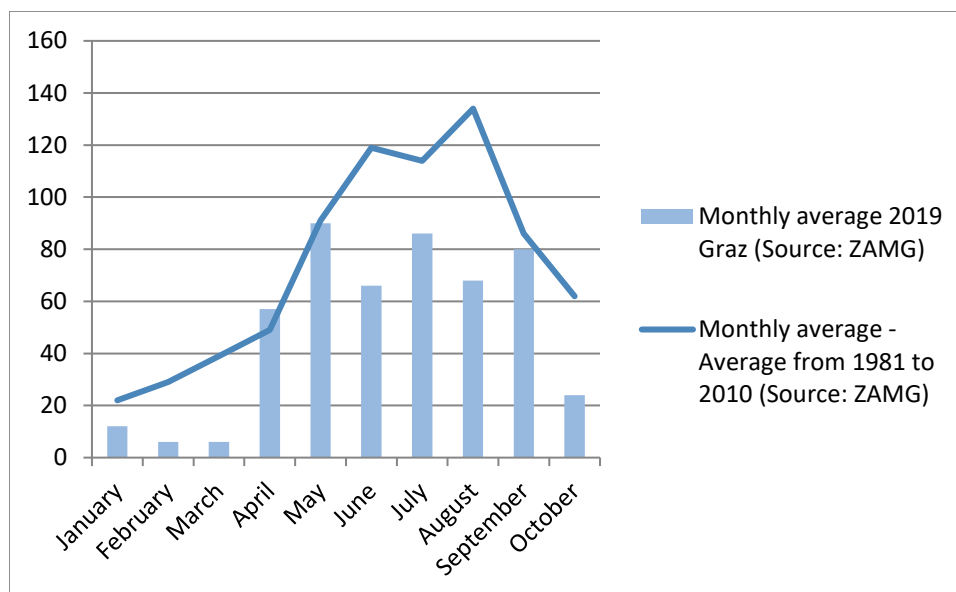


Fig. 1: Precipitation data for 2019 and average values of the years from 1981 to 2010 (Graz).

Fertilisation was carried out on 4 April 2019, six days before sowing. The fertilisation process applied 2,100 kg of BioAgenasol® per hectare; with an additional 100 kg of patent potassium (30% K₂O) per hectare, this corresponds to 115 kg of nitrogen, 52 kg of phosphorus, and 61 kg of potassium. Nutrient equivalence was ensured for both the BioAgenasol® variant and the mineral fertiliser variant. The sowing rate on 10 April amounted to 80,000 grains per hectare. The date of harvest was 24 September.

Overall soil examinations showed that phosphorus was in range C and potassium in range D. This represents a good nutrient supply. With a value of 6.4, the pH was in the weakly acidic range. The humus content was recorded in a middle range, with BioAgenasol® achieving a humus increase of 0.1%. The nitrogen replacement potential was likewise in the medium range. It was particularly noticeable that the nitrogen replacement potential of the mineral fertiliser variant dropped rapidly into the low range shortly after seeding (< 30 mg N/kg of fine soil).

The main focus of this experiment was on nitrate nitrogen in the soil, which was regularly examined. The measurement results pointed to a similar trend throughout the regular measurement intervals. It became apparent that in comparison to the mineral fertiliser variant, the BioAgenasol® variant exhibited generally lower nitrate nitrogen levels in the soil. The nitrate concentrations measured in the leachate tests may be described as moderate and are quite common for these kinds of soils. The lysimeter measurement series of the fertiliser variations show a similar trend for the measured nitrate concentrations. In this respect, the mineral fertiliser variant showed generally higher levels of nitrates. From the outset, the nitrate concentration measured in the leachate was significantly lower with the BioAgenasol® variant than with the mineral fertiliser variant. Due to the low rainfall in 2019, no leachate could be extracted via the lysimeter from mid-July onwards. However, as in the last few years of trial, the lower level of the BioAgenasol® variant has also been confirmed by results derived from the suction cups. Leachate could be extracted from these via the prevailing low-pressure

conditions over the entire sowing period. On a rough average, the nitrate measurement results derived from the lysimeter for the mineral fertiliser plot are 1.5 times higher than on the BioAgenasol® plot and 2.5 times higher with the suction cups than on the BioAgenasol® plot.

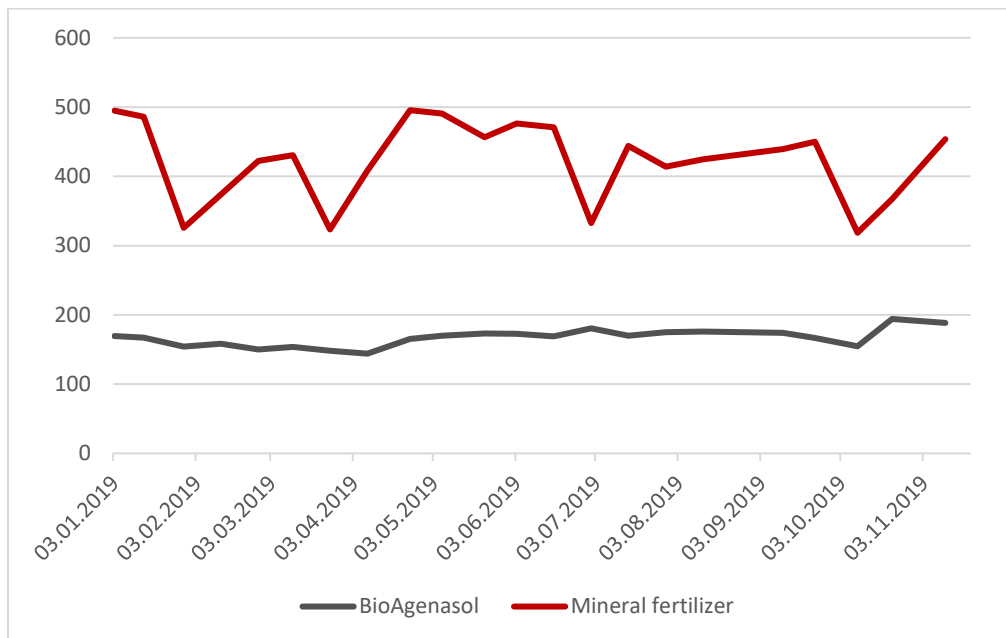


Fig. 2: Nitrate concentrations as recorded by suction cups in mg NO₃/L (comparison of BioAgenasol and mineral fertiliser)

As in previous trials, the 2019 season BioAgenasol® was not only able to match the performance of mineral fertilisers but it was also able to produce a considerable additional yield of 4% in the grain maize fertilisation trial with a grain yield of just over 16 tonnes per hectare. In this context it should be noted that, according to the literature, organic fertilisers for grain maize have a 37% lower yield than mineral fertilisers. This leads to the conclusion that with an assumed annual effectiveness of about 65%, BioAgenasol® can, when applied annually, show its full potential in the third year. As in previous years, regular soil sampling over the entire period showed lower readings for nitrate nitrogen with the BioAgenasol® variant. The nitrate levels in the leachate of the lysimeter may be described as moderate and are quite common for these types of soils. This is also very promising for the reduction of nitrate levels in groundwater. BioAgenasol® has once again demonstrated its positive contribution to groundwater preservation.

If you are interested in the complete edition of the trial, please contact us at feed@agrana.com.