

Studies on the correlation between the soil microbiology and Kautsky parameters K_1 and K_2 of the chlorophyll fluorescence dynamics of winter crops in early spring

Measurement of chlorophyll fluorescence dynamics (CFD) and the determination of Kautsky parameters K_1 and K_2 is a sensitive method for the determination of plant vitality. In general, a plant is considered the healthier and more vital, the larger the parameters K_1 and K_2 are. In early spring is the question of how cultures have survived the winter period and what factors have made it impact, of particular interest because the agronomist must decide on the further applications of fertilizers and plant protection in this period.

Измерение динамики флуоресценции хлорофилла (CFD) и определение параметров Эффекта Каутского K_1 и K_2 является чувствительным методом для определения степени жизнеспособности растения. Как правило, чем выше параметры K_1 и K_2 , тем активнее протекают процессы в клетках растения. Ранней весной у аграриев всегда чрезвычайно актуален вопрос, как растение перенесло зимний период и какие факторы повлияли на его состояние сейчас. Эта информация позволяет определить, какие удобрения и средства защиты должны применяться в дальнейшем.

In the period from 27.02. until 11.03.2013 we measured on 141 experimental areas in Germany with winter crops (winter wheat, winter barley, winter rye, winter rape) the chlorophyll fluorescence dynamics (CFD) with the hand-held meter FloraTest / 1 /. Four weeks later, soil samples were taken from the same areas with regard to studied the atmospheric nitrogen-fixing bacteria (N), phosphorus-mobilizing bacteria (P) and humus (H) at the Academy Institute of Microbiology and Virology in Kiev, Ukraine.

Generally, it is assumed that the vitality of the plants is largely determined by the nutritional status. At the end of the winter period when no mineral fertilization is carried out, the nutritional state is dominated by the Soil Biology. Figures 1 to 6 show plots N (K_1), N (K_2), P (K_1), P (K_2), H (K_1), and H (K_2). The high scatter can be explained mainly by the differences in the measured temperature, which varied locally between +2 C and +9 C, and remained excluded from the evaluation of the sensitivity of the temperature-dependent CFD curves. The measurements show that at the end of the winter period in the soil the concentration of nitrogen-fixing bacteria weakly correlated with the Kautsky parameters K_1 and K_2 . A dependence on the humus content and the concentration of phosphorus-mobilizing bacteria could not be observed.

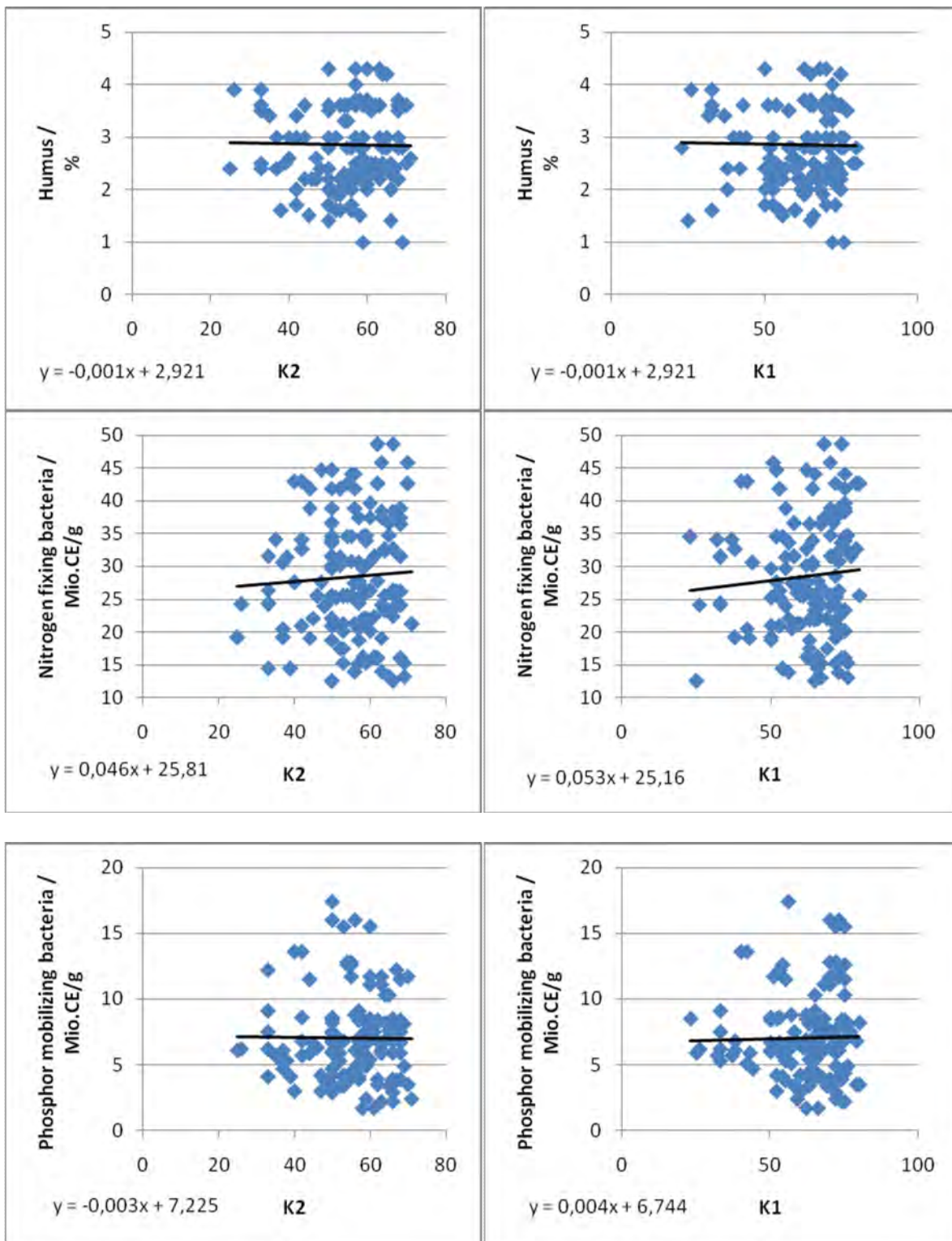


Fig. 1 to 6: Plots N (K₁), N (K₂), P (K₁), P (K₂), H (K₁), and H (K₂)

Literature

1. Romanov V. et all, Proceedings 5th Radostim Conference, p.153, Dnepropetrovsk 2010, Ukraine