On the frequency of use of biodynamic preparations

Does the repeated use of field spray preparations have an effect on product quality?

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The quality of a plant or crop is not just the sum of its parts; influenced by the complex interactions and feedback loops between all the different components of the system.

… Therefore, creating a healthy and balanced ecosystem is the most important basis for producing high-quality food crops. It is not enough to just concentrate on individual factors such as fertilization or predators, but it is necessary to keep an eye on the entire ecosystem. Biodynamic preparations can be used to support the health and vitality of the soil and plants. In my understanding, these preparations serve as a stimulus to support natural processes and promote the harmonious, healthy growth of our crops, as they strengthen the ecosystem as a whol

Rhythm plays an important role as an essential part of living things. Nature has its own rhythms with the seasons, day and night cycles, tides and many others. Plants grow and thrive in harmony with these natural rhythms and change their growth patterns accordingly. These biological rhythms are closely linked to the cosmic cycles of our solar system.

For me it is therefore an exciting research question: Can the frequency of use of the preparations as “rhythm pulse generators” improve their effectiveness? What matters is not the amount of preparations sprayed out, but rather finding the right rhythm to support the plants and soil in the respective farm organism. Although there is some research suggesting that higher frequency of use may lead to better results, the evidence is still limited (Spieß, 1978).

It is therefore necessary to carry out further research to find out how the frequency or rhythm of application of field spray preparations can help to improve their effectiveness. We expect impacts particularly on the quality of the plants. Therefore, experiments should first check whether it is possible using image-creating methods to differentiate between plants that have been treated differently with the preparations - grown on a Demeter farm or in a container experiment.

Influence of multiple preparation injections on the quality of spring wheat

At the Demeter farm Hofgut Oberfeld in Darmstadt, we examined the previous crop and preparation factors in spring wheat: the previous crop was either alfalfa (high N supply to the next crop) or tall fescue (low N supply). The field spray preparations were used either minimally - once according to the minimum requirement of the Demeter guideline - or multiple times. These factors and their levels were systematically varied and repeated four times in a splitting system to examine the influence on yield and quality of spring wheat. The soil type of the test field is pseudogley brown earth with around 0.5% Corg, the soil type is loamy sand.

Our hypotheses were:

- The spring wheat yield differs significantly depending on the previous crop.
- The previous crop variants can be discussed with the image creators Methods can be differentiated.
- There is no yield effect depending on the frequency of use of the preparations.
- Spring wheat treated with multiple application of preparations increases resistance to aging in image-creating methods as an aspect of product quality.

In image-creating methods, a high resistance to aging is an indication of a high stress tolerance. We used copper chloride crystallization as the image-creating method. Various plant extracts are applied to a glass plate together with an aqueous solution of copper chloride dihydrate, they crystallize and produce specific dendritic (tree or bush-like) crystallization patterns. The degree of growth, ripening and decomposition of the product is reflected in these patterns as characteristic units (“shapes”) phenomenological characteristics (cf. Fritz et al. 2022). To evaluate the crystallization patterns, reference series of the same food - in our case wheat - with known different origins, ripening phases, growth conditions and age are used.

Application of the preparations in the experiment

At the Oberfeld site, after the fodder plants were plowed on February 22nd, 2021 and rot manure fertilized with and without compost preparations, spring wheat was sown on March 9th, 2021. The biodynamic field spray preparations were applied on very specific dates using the backpack sprayer and spray protection (see Table 1, p. 42).

Results

The cool and wet weather in 2021 appeared to be unfavorable for the growth of spring wheat. After alfalfa, only a below-average spring wheat yield of 2.2 t per ha-1 was achieved.

As expected, the yields in Figure 2 (p. 43) show that spring wheat after a two-year previous crop of alfalfa performs significantly better than spring wheat after a two-year previous crop of tall fescue.

In fact, the multiple application of the biodynamic field spray preparations had a significant influence on the grain and straw yield of spring wheat as a follow-on crop to alfalfa, but no significant influence on the yield of spring wheat after tall fescue. The nitrogen content in the grain and straw as well as the thousand grain weight did not differ significantly depending on the frequency of preparation application.

This suggests that the effect of the preparations on yield may vary depending on the previous crop (high N supply versus low N supply) in otherwise similar environments. The previous crop of alfalfa in combination with the multiple spraying of preparations had a clear yield advantage for spring wheat. Whether and, above all, how the alfalfa has benefited from multiple administration of the preparation – through shoot growth and/or root growth – is currently still being investigated

Can the previous crop variants with the Different image-creating methods can be distinguished?

As a rule, growth and differentiation occur side by side in the plant. During growth there is an increase in volume and during differentiation there is a qualitative change in the form or function of a cell or organ. The species-typical balance between growth and differentiation of a plant can become imbalanced, for example due to high nitrogen availability, which can lead to inadequate differentiation >>>

Treatment dates for the different preparation variants

Table 1: Spring wheat 2021

Date	minimal Application of preparations	multiple Application of preparations
02.03.	100 kg N over rotted manure	100 kg N over rotted manure with compost preparations
02.03.	Horn manure	Horn manure
09.03.	sowing	sowing
09.03.	Horn manure	Horn manure
April 27th	Horn manure	Horn manure
08.06.	Horn pebbles * (In the morning)	Horn pebbles * (In the morning)
June 21st		Horn pebble blossom (morning)
15.07.		Hornkiesel ripening (afternoon)
02.08.	harvest	harvest

* to shoot

Table 2: Lamb's lettuce 2022

Date	control Water	preparations minimal	multiple Application of preparations
09/26	Water	Water	Horn manure
09/27		Planting in pots	
09/27	Water	Horn manure	Horn manure
09/28	Water	Water	Horn manure
10/27	Water	Horn pebbles	Horn pebbles
10.11.	Water	Water	Horn pebbles
18.11.		harvest	

(Athmann 2011). When assessing images using copper chloride crystallization, the term differentiation is related to the maturity of the sample; in the optimal ripeness stage, the differentiation is very high. It was therefore expected that the tall fescue samples in the images would show higher differentiation than those from alfalfa, since the grass leaves a lower N supply for the spring wheat. The encrypted wheat samples were examined to see whether they could be grouped according to the previous crop.

The samples could be identified correctly; the spring wheat with the previous crop tall fescue showed a higher differentiation and higher resistance to aging in the images compared to the previous crop alfalfa. This does not mean that tall fescue is the better previous crop for spring wheat, but rather that it is possible to distinguish previous crop effects using copper chloride crystallization.

Fig. 1: Preparation intensity in CuCl crystallization,
Briweri salad variety

Only compost preparations in the substrate: with aging characteristics

Compost preparations and 2 x horn manure, 1 x horn pebbles: very high radiation and center coordination

The second question was whether the repeated use of biodynamic preparations had a positive effect on the aging resistance of wheat.

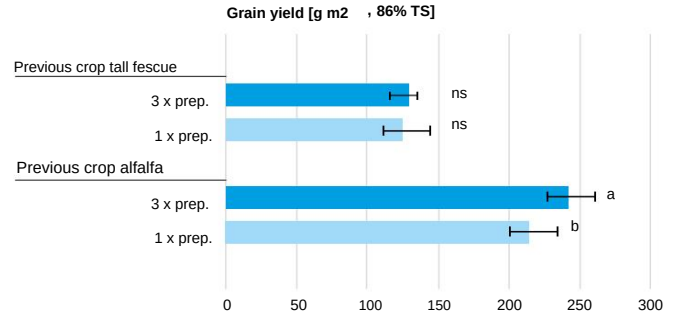
Since we expected only small differences between the variants, an aging series of 3.5 and 14 hours and 3 and 6 days was used. This stress test is used to check how long the samples can maintain their shape intensity and aging resistance. For this purpose, a double sample batch was prepared with 10g flour and 50ml demineralized water and incubated in a drying cabinet at 28° degrees for 3.5 or 14 hours and then filtered for analysis. The filtrate of the 14-hour batch was stored in the refrigerator for 3 and 6 days for the aging series.

The wheat sample with the previous crop alfalfa and multiple application of preparations appeared somewhat more uniform in the images of copper chloride crystallization with more center coordination and better transmission. In contrast, the variant with minimal use of preparations was slightly less powerful and more uneven with less center coordination. Center coordination defines whether the image center (the starting point of crystallization) appears as the conductor of the image. The wheat samples with previous crop tall fescue and multiple application of preparations showed slightly better resistance to aging and are slightly better differentiated than with minimal application.

The results show that at the same nutrient-poor location, the wheat samples with multiple preparation sprayings appeared somewhat stronger, more dynamic, more differentiated and less aged.

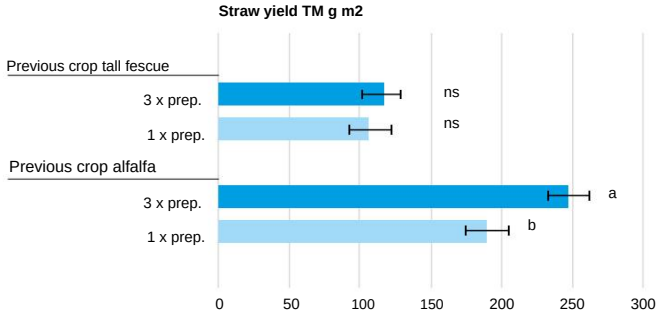
This study succeeded in differentiating the frequency of preparation use in blinded wheat samples. Since, as mentioned at the beginning, aging is closely related to a loss of quality, we wanted to investigate in a next step whether the samples can also be differentiated using analytical methods.

Fig. 2: DOES MORE FREQUENT ADMINISTRATION OF THE PREPARATION EFFECT?



Grain yield of spring wheat in 2021 according to different previous crops at the Oberfeld location. Mean values (n=4) and standard errors are shown, different letters = significant differences (Tukey test, p<0.05) separately for the previous crops.

Fig. 3: PREFRUITS, PREPARATION FREQUENCY AND STRAW YIELD



Straw yield of spring wheat 2021 after different previous crops and preparation applications at the Oberfeld location. Shown are mean values (n=4) and standard errors, different letters = significant differences (Tukey test, p<0.05) separately for the previous crops.

Multiple drug administration and Product quality of lamb's lettuce

In a container experiment, we tested whether lamb's lettuce, purchased as young plants, reacts to the frequency of application of field spray preparations. The experiment was carried out in a randomized block system repeated 10 times and the factor of preparation use was varied. A water control, a single application of horn manure and horn pebbles as well as a rhythmic application of horn manure (on 3 days in a row) plus two pebble treatments were tested (see Table 2).

Similar to spring wheat, the hypotheses were that yields would not differ between the control group (water treatment instead of preparations) and those with minimal or multiple application of preparations. The second hypothesis was that lamb's lettuce that was treated several times with the preparations would show fewer signs of aging using the imaging methods than lamb's lettuce that was treated minimally with preparations or only with water.

Results

There were no significant differences in the yield of the lamb's lettuce; the dry matter yield was between 1.02 and 1.18 g per plant. With copper chloride crystallization, the hypothesis that lamb's lettuce shows the lowest signs of aging with multiple use of the preparations was confirmed. The images also clearly show that this variant has the highest substance effect and center coordination. The water control, on the other hand, shows the lowest substance effect; this criterion is associated with the vitality or growth power of the sample. The one-time application of horn manure and pebbles is in the middle range and has a higher substance effect and a more fruit-like character than the control. With copper chloride crystallization, a clear classification of the samples could be made and the results could be objectified.

Influence of multiple drug injections on the product quality of lettuce

Colleagues Julian Keller and Uwe Geier also carried out a touch test on lettuce plants of the Briweri variety using the biodynamic preparations in 2022. The control variant only received the compost preparations in the growing substrate, the intensive biodynamic variant also received 2 x horn manure and 1 x horn pebbles. For each variant, 10 plants were grown outdoors in pots. These samples were also examined with the question of whether the two variants could be distinguished using crystallization. In this experiment, the control also showed signs of aging and the variant with the field spray preparations showed high transmission and center coordination (see pictures on page 4

Conclusion and outlook

The fact that it was possible to distinguish coded samples of spring wheat, lamb's lettuce and lettuce that differed only in the frequency of drug injection is an important step in studying the effects of drug treatments on different crops. It enables different preparation applications to be assessed and can help to optimize them. In the following experiments, root examinations of the cultures, people's reactions to the products (Empatic Food Testing) and ingredient analyzes will be integrated as further methods.•

literature

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