Horn pebbles to cucumber in the greenhouse

Influence of frequency of application on production and nutrient absorption - a practical experiment

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The cucumber *(Cucumis sativus L.)* belongs to the pumpkin family *(Cucurbitaceae).* It is an annual plant that climbs and can grow as long as you allow it. It is important to know that the plant reaches its maximum potential at a certain point and then produces less. A leaf and a tendril emerge from each node, and a shoot and one or more flowers grow in each leaf axil. In order to achieve good growth, the plants must be cared for and attention must be paid to a balance of forces within the plant. Impulses and forces are stimulated by biodynamic preparations not only in the plants, but also in the environment, in the entire agricultural organism. The life processes are harmonizes and promotes self-regulation. The preparations horn manure (500) and horn pebbles (501), which are sprayed onto the soil and plants, have an important influence on the entire life process of the plants; Horn pebbles are a supplement to horn manure.

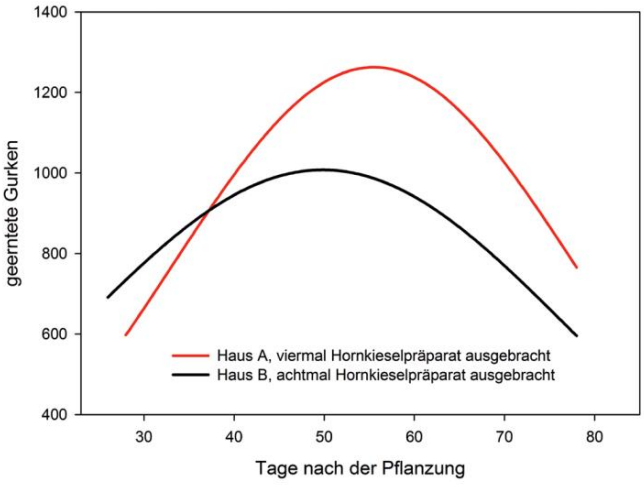
In principle, according to Demeter guidelines, horn pebbles must be applied at least once a year during the growing season. It is a way of "spraying the plants with light" and its use is particularly important for sheltered crops, as horny pebbles are said to compensate for lack of light and mitigate the effects of heat (Masson, 2013). However, there are various criteria that you should pay attention to when using it.

For example, you should not spray in hot or dry conditions as the horn silica preparation promotes evaporation. Fritz (2007) describes experiments in which horn silica was applied once or several times in different growth periods of the plants. In his own experiments with bush beans and red lettuce, he found that early horn silica treatments slowed down vegetative growth and late treatments delayed senescence or extended the maturation phase. In the case of carrots and beetroot, early horn silica treatment (from four weeks after sowing) showed an inhibition in the growth of the leaves (Thun, 1967), in oats and wheat an increase in yield and grain weight was observed with late application in plant development (Klett, 1968), in potatoes the ripening was promoted and in winter cereals Maturity delayed.

The recommendations on the amount and frequency of horny silica application vary in the specialist literature. Depending on the plant culture and plant condition, the following methods are described (Handbook Preparations Demeter 2014; Masson 2013; Thun 1967; von Wistinghausen 2000): 2 to 5 grams (g) in 20 to 50 liters (l) Water per hectare (ha). Rhythmic application on three days in a row at weekly intervals increases the effect;

- 60 to 240 cm3 in 5 to 100 l of water ser, per ha;
- 1 g in 13 l of water per 0.4 ha;
- 2 to 4 g/ha in 25 to 35 liters good quality water;
- for carrots twice in July and once in August;
- three sprayings for winter cereals (in autumn, April and May);

The differences between the recommended amounts, plant cultures, growth periods and frequency of use make it clear that you have to make your own experiences under the individual conditions for each plant species.



Graphic 1: Less is more: Cucumber day with varying frequency of horn silica application (4 times vs. 8 times)

The information on fertilization in cucumber cultivation is also relatively imprecise and sparse. Often only the total amount of macro- and micronutrients is stated, and not the nutrient requirements of the plants during their respective phenological phase.

Ruiz (1998) states 10 to 20 g m2 of N (as KNO3) are economically best. The general recommendations of seed manufacturers or agricultural supply companies give the following data on nutrient intake per desired fruit production: 300 t/ha cucumbers in the greenhouse take 450 to 500 kg N, 200 to 250 kg P2O5, 800 to 1000 kg K2O, 130 kg MgO and 300 kg CaO from the soil under conventional management. In organic or biodynamic cultivation, the nutrients must come from organic materials and cover the plants' nutrient needs in a natural way. Here, too, there is a need to develop efficient plant nutrition that is adapted to the respective conditions.

As part of an experiment in the greenhouse of the Demeter farm Landgut Pretschen (Brandenburg), I tried to investigate these two important questions: How does the frequency of horn silica application influence the production and general condition of the cucumber plants in the greenhouse?

What does the nutrient absorption of the cucumber plants look like when using horn pebbles?

Horn pebble application in Glasshouse

Growing vegetables in spring is in Germany can only be protected in Germany because of the outside temperatures Greenhouses, tunnels, etc. The first cucumbers (variety: Airbus) of the 2015 season were planted in the greenhouse of the Demeter organic farm Landgut-Pretschen at the beginning of March. The young plants came from the Natterer organic nursery (Stuttgart), were sown there on February 2nd (planting time according to Maria Thun's calendar) and sent to Pretschen when they were 42 days old. There they were planted in the greenhouse on March 16th (fruit day according to Thun), 1.25 plants per m2 . In order to achieve a stronger stimulus for the plants, horn manure was applied the day before planting.

The experiment was carried out in two houses (2,500 m2 each) 80 days from the start of planting. In house A, horn silica preparation was applied four times, 3, 25, 44 and 69 days after planting, while in house B, horn silica preparation was applied for the first time 10 days after planting and then every 8 to 10 days (a total of 8 repetitions). -was sprayed. The horn silica preparation was stirred at 6 a.m. and sprayed directly afterwards (at sunrise).

All other conditions were the same in both houses. The air conditioning was controlled as follows: The temperature setpoint for day/night was set to 20/20°C. For the dehumidification program, the room setpoint was set to 90/90% day/night for the first six weeks and then reduced to 80/80%. Depending on the outside temperature, wind speed or brightness, the windows in both houses were either opened, the fans turned on or the heaters activated to control the air humidity. To get both horn silica treatments

A look at the practical test Pretschener's greenhouse Demeter company

compare, were the harvested Cucumbers counted daily, weighed and measured at random sen.

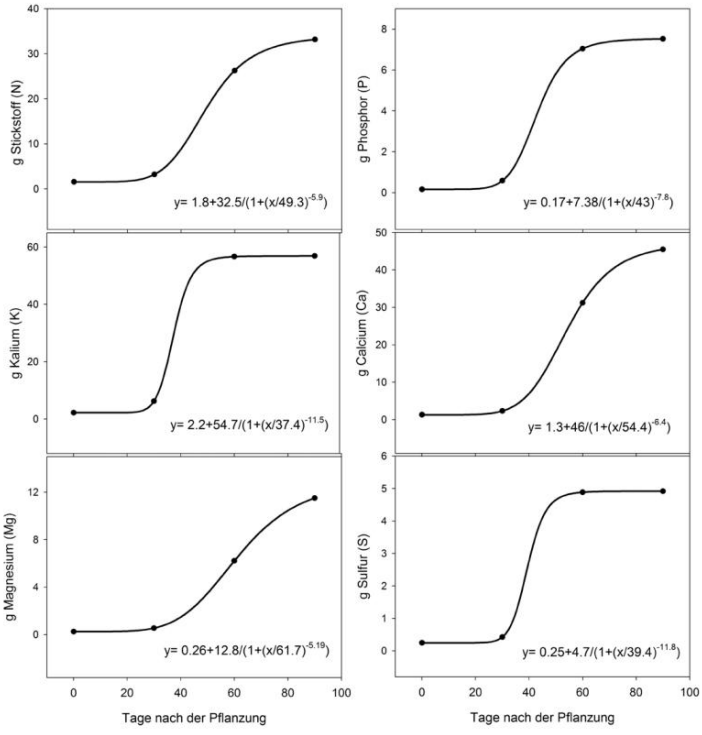
Results: Influence of Frequency of application on the production

The plants in House B began producing fruit approximately 26 days after planting. Although production in house B was higher in the following 11 days and the harvest was also two days earlier than in house A, production in house A was much higher overall (Figure 1).

At the end of the experimental period, 52,574 cucumbers were harvested in house A, while 42,492 cucumbers were harvested in house B (19.2% less). The weight of the cucumbers was 330 ± 25 g and the length was 28 ± 2.5 cm (Figure 1). The differences to the cucumber pro-

Production in the previous year was even greater for the same period. The horn silica preparation was only used once in 2014 and only around 33,500 cucumbers were harvested per house. It becomes clear that it is important to determine the correct frequency of Hornkiesel applications for greenhouse cucumbers in the greenhouse. In the same direction, a finding by Masson (2013) goes that there is a negative effect if the silica preparation is used too rarely and the hormist preparation too frequently (more than 3 to 4 times, especially when the horn silica is sprayed).

You could see the influence of the Horn Kiesel application not only in the harvest quantity, but also in the color of the plants. The plants in House A that were pebbled a total of 4 times had a darker green color compared to those that were pebbled 8 times and both variants were darker and healthier looking,



Graphics 2 and 3: Course of requirements for the various main nutrients Cucumber plants from planting to harvest

than the plants from the comparable growing period in 2014 (photos opposite). The plants in house A remained dark green longer than in house B. This observation is initially in agreement with observations from agricultural practice.

According to Fritz (2007), runner beans showed that the leaves became darker and remained green longer as they matured; and in his own experimental results with bush beans, he observed that with the late Hornkiesel treatment the leaves were darker, greener, [illegible] that the horn silica treatment was suitable for the cucumber plants under their own conditions up to a certain frequency, approximately once every three weeks. If used more frequently, the harvest quantity and intensity of the color will be reduced.

Nutrient absorption of the Cucumber plants

A sufficient supply of nutrients is important for product quality: otherwise the plants lack the basic building blocks to build complex living structures or are not strong enough to fight against diseases or pests. The living elements from compost, organic materials, etc. provide the plants with the necessary energy and strength and thus ensure the high quality of the biodynamic products. Anyone who wants to meet these high fertilization demands must ask themselves: How much compost do I need for my plants under the given conditions?

Which materials are best? What proportion of the nutrients from the compost are directly available to the plants? How often should I feed the plants organically? Fertilize materials? Analyzes provide initial information, in the knowledge that the connection of the entire organisms of the system (plants, earth, animals, nutrients, energies, cosmos, etc.) cannot be shown.

We can therefore only describe some of the biodynamically produced products; The energies and forces that plants absorb through the preparations and growth in the living soil cannot be precisely measured, but active ingredients, bio-molecules and macro- or micro-nutrients can. We analyzed the nutrients in the plants. In house B, plant samples were taken every 30 days and examined for macro- and micro-nutrients throughout the plant. These measured values are shown in graphic 2 and as equations and curves. Using the equations shown, it is also possible to calculate nutrient requirements for a specific period of time. By the end of the experiment, the cucumber plants in house B had absorbed the following amounts of macro- and micronutrients (per plant): 33.17 g N; 7.52 g P; 56.89 g K; 45.49g Ca; 11.51 g Mg; 4.92g S; 8.78 mg Cu; 66.12 mg Zn; 82.5 mg Fe; 53.12 mg Mn; 68.51 mg B; 1.48 mg

The graphics shown show the nutrient requirements in the respective phenological phase. On this basis, the amount and frequency of use of organic fertilizer materials can be determined. Etcheverrs (1999) talks about methods and factors for determining the fertility of the soil and the nutritional status of plants, some of which must be determined on site: content of raw materials for compost, availability of elements depending on climatic conditions, content of the Nutrients and efficiency of the

Soil (how much of the nutrients can the soil “store”?), and beneficial microorganisms in the process of mineralization. In order to achieve the best quality compost, the compost preparations are crucial from a biodynamic point of view. They stimulate the microorganisms, which means that composting occurs faster, a higher absorption capacity of nutrients is achieved and more nitrogen is retained (Reeve, 2010). The field and compost preparations only show their full effect if the plants have a sufficient or optimal amount of all nutrients available.

Summary

The test results presented are intended to illustrate how the amount and frequency of horny silica application for cucumbers in the greenhouse can be determined in practical trials in order to optimize the application for a plant species. Depending on the local conditions, this application can be used to strengthen the plants or slow down their growth. It is therefore important to check the optimal frequency and amount of horn silica in the respective plant culture and under your own conditions.

In crops like cucumbers, where a fruit is produced approximately every three or four days, it is not possible for every fruit to be pebbled. Nevertheless, the trunk, leaves and tendrils of the plants, through which the fruits are nourished, strengthened as a result of the horn silica application.

For the cucumber plants in the Landgut-Pretschen greenhouse, it was determined that the Horn-kiesel application should take place at intervals of around 21 days and should take place for the first time almost immediately after planting in order to achieve a better harvest.

During the plant analysis, the amounts of nutrients per phenological phase were quantified at intervals of 30 days. This is the foundation for a specific and efficient approach to fertilization. In the next step, the properties of the organic fertilizer materials would have to be characterized on site.

terized and compared with the nutrient quantities from the plant analysis.

outlook

There are still some influencing factors that need to be clarified: e.g. B. the attention with which the plants are cared for influences their growth. Plants that are not just seen as “producing machines”, but as living organisms, with their own and inner powers that are part of a system, grow better and achieve a higher quality of their organs (leaves, Fruits, roots, etc., Steiner, 2001). I

The effect of twice as intensive use of the Biodynamic preparation 501 was also on the leaf color recognizable: rich dark green when treated four times Variant (left), brightening after eight treatments (right).

Sources

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