Influence of the time of application of horn silica on the development of French beans and lettuce

from Jurgen Fritz

Dr. Jürgen Fritz,
Institute for Organic Agriculture,
University of Bonn,
Katzenburgweg 3,
53115 Bonn,
j.fritz@uni-bonn.de

Experimental field with beans, partly shaded

Short and sweet:

The partially opposite reaction of the plant to horn silica application gave rise to further investigations.

In the experiment, horn pebbles were produced from bush beans and lettuce applied at early or late stages of development.

The early application suppressed vegetative growth, the late one extended maturity.

In field and vessel tests by FRITZ (2000) were included 36% of the parameters examined showed significant plant reactions after horny silica treatment compared to the untreated variants noted. The variants with horn silica treatment changed at *Rotem* *lettuce* in terms of storage loss and in the case of *bush beans* in terms of the yield of the first pod harvest, the shoot length, the start of flowering, the harvest index, the chlorophyll content of the leaves and disease infestation in storage through modified environmental conditions less severe than in the untreated control variants. One-sided influences Growing conditions, such as e.g. B. shading and fertilization, were partially reduced by treatment with horn pebbles compensated. This was over-consistent with earlier than This is also the case with horny silica application later in plant development. This Test results from FRITZ (2000) are in agreement with the studies by KLETT (1968), ABELE (1973), SPIKE (1978), KOTSCHI (1980) and RAUPP & KÖNIG (1996), where through Horn silica application to grain, sugar beets, carrots and other plant species one-sided growth conditions compared to Control to some extent too were compensated.

Reactions of plant development in different Directions to earlier and later horn pebble application compared to the control were found in the studies by FRITZ (2000) at 29% the parameters were found to have significant differences. KLETT (1968) also presented such non-uniform reactions of the plants after early and late application of horn silica in the plant development of oats, Wheat, potatoes and beans solid. He saw early horn silica treatments as that promotes vegetative growth, late application of horn silica promotes maturity at. This resulted in instructions for action agricultural practice of biodynamic derived from agriculture. With The studies presented here were again carried out experimental question investigated, whether with a variation of the Modifying the timing of horn silica application on plant development can be influenced. However, only they can do that Parameters for which different plant reactions occur earlier and later Horn silica application was determined, digestion give. The following will be Therefore, these parameters in particular are shown.

material and methods

Field trials: Over the years In 1994 and 1995 bush beans *(Phaseolus vulgaris var. nanus)* and red lettuce *(Lactuca sativa var. cris-pa)* were grown in field trials on a test farm in Neu-Eichenberg, northern Hesse. They were varied Factors:

1st date of the horn silica plant

turn, early and late in the
Plant development (beans:
without / 2nd leaf sta-
dium BBCH 12 / before flowering
and for sleeve formation BBCH
*59-73; Salad: without / 7th-9th
Leaf stage BBCH17-
19 / 70-80% of the harvest
weight BBCH 47-48),
2. Light (45% / 100% of
photosynthetically active
radiation, PAR) and
3. Fertilization (0 / 450 dt ha-1
manure compost). The soil
base was old
In 1994 and 1995 a para brown
soil was used for the bush beans
from loess and one for salad
Approximately 20 cm thick loess layer
on the tone of Keuper.

Vessel tests: In the test years
1996 and 1997
became three four-factorial
Vessel tests on the Wiesengut
experimental farms in
Hennef/Sieg and Neu-Eichen-
berg were carried out in the
greenhouse. One of the factors
The horn silica treatment (or
none) was present in each case
the flower and the formation
of pods (BBCH 59-73).

The biodynamic compost
preparations and the horn
manure preparation were used
in all field and vessel tests
used. For all variants
with horn silica treatments
were three applications
carried out. Horn pebble was
applied in the early morning
hours at sunrise. (Details about
the method
see FRITZ 2000).

Results: The timing matters a difference

Field tests in 1994 and 1995

The yield of the first and
second pod harvest was in
Trial year 1994 by 40%
higher than in 1995. In
The experimental year remained 1994
Horn silica treatment
The comparatively high yield
level of the first husk harvest
has no effect on earnings
(Fig. 1). In the experimental year
In 1995, with low yield levels,
the horn silica treatment
increased both early
as well as late in plant
development the yield
first pod harvest. Differentiated
in the contrast comparison
the two variants
Horn silica treatment of
the variant without horn silica
treatment with the error
probability ÿ = 0.055.
This result is in agreement with
the hypothesis of partial
compensation for unfavorable
growth conditions with horny
silica applications

Comparison to control.

Greener in the second harvest
Pods in 1994 and
In 1995 all of them were sent to the
Bush beans remained
Pods picked. The second
Pod harvest was used as a
parameter to record the still
existing growth potential
towards the end of plant growth.
The
Yield of the second pod
harvest was very different in
the two experimental years
in terms of weather
1994 and 1995 in comparison
for checking earlier
Horn silica treatment always
lower and after later
Horn silica treatment always
higher (Fig. 1). When both are
evaluated together
Years of experimentation increased the
late horn silica treatment
Compared to the early horn-
silicone treatment, the legume
yield of the second harvest is increased
by 8.6% (perception of error)

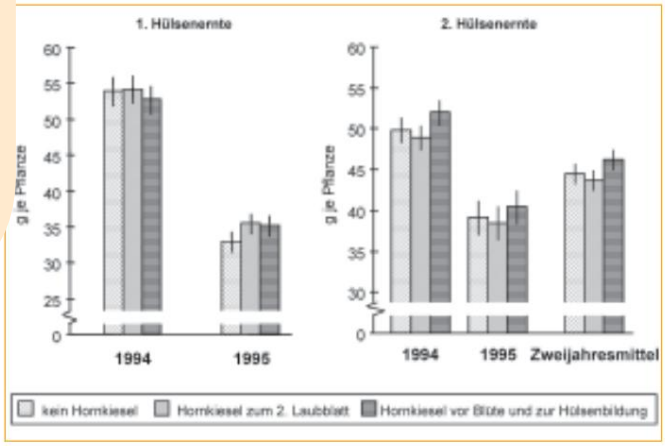

Fig. 1:
Horn pebbles are best used twice and at the right time:
Fresh matter yield of the first and second pod harvest of French beans. Field tests of the Years 1994 and 1995. Vertical Lines: limit difference Tukey test ÿ = 0.05.

probability ÿ = 0.06). The
Number of pods of the second
pod harvest was in
Means of both experimental years
through late horn silica
treatment compared to
control significantly
7.6% increased. A fact that
was not discovered after
early horn silica treatment.

The lettuce yield of the trial
year 1994 was earlier
Horn silica treatment in the
Plant development significantly
lower than later
Horn pebble application (Fig.
2). The side shoot formation
of pickled lettuce – interpreted
as a parameter of vitality
of plants – was both
through full light irradiation,
as well as 450 dt ha-1
Manure compost in the experimental year
Increased in 1995. In the 7th to
9th leaf stage with horny pebbles
treated plants formed
fewer side shoots than that
Control (Fig. 2). Through
Horn silica treatments
70 – 80% of the harvest weight
became the number of side shoots
compared to control and
for early application in the
Plant development increased.
In 1994, this parameter had not
yet been examined.

These facts show

The BBCH scale is an international one Agreement on the phenomenological Description of the growth stages of Crops from the beginning of germination (0.1ff) through flowering (6.0ff) to maturity and Dormancy (9)

point out that an early one
Horn silica treatment in
of plant development
vegetative growth in the
youth development
Bush beans and lettuce
decrease, but a late horn-silicone
treatment, on the other hand, decreases
can cause a delay in
senescence.

Vessel tests in 1996 and 1997
In the vessel experiments too
Bush beans were only made
according to the horn pebble
Variant “Hornkiesel late”
the field tests (before the
flowering and pod formation
BBCH 59-73) used. In
all three vessel tests
increased the late Hornkiesel
treatment compared to
the untreated plants

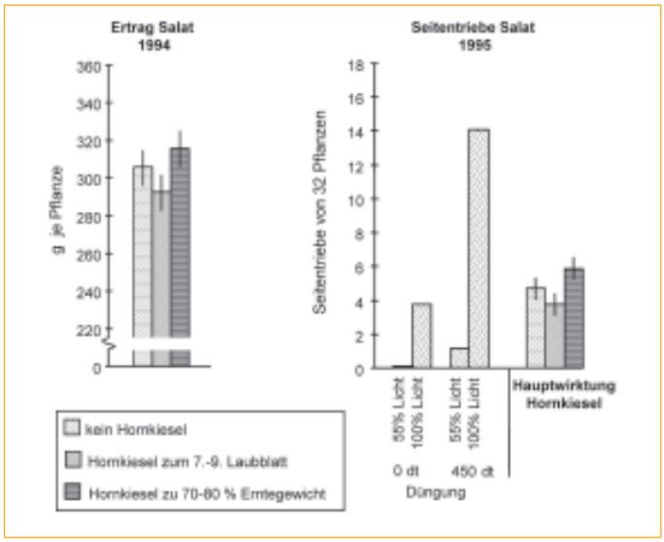

Fig. 2:
Increases or decreases depending on the stage Hornkiesel the number of side shoots. Fresh mass yield and side shoot formation of red lettuce. Field tests in 1994 and 1995. Vertical lines: Limit difference Tukey test ÿ = 0.05.

the chlorophyll contents in the
Final phase of bean growth is
significant (Fig. 3).
The results support
the conclusion that
the horn pebble application in
the late vegetation phase
delays aging and as
compensatory effect
on growing conditions
with high temperatures in
Greenhouse interpreted
can be.

Discussion: Brakes Horn pebbles support vegetative development and promotes maturation?

Early treatments with
Horn pebbles led to
investigations by KLETT (1968)
Compared to the untreated
control, there were reduced
yields for oats and wheat.
These experimental results
are in agreement
with the second pod harvest
in the experimental years 1994
and 1995 (Fig. 1) as well as the
Lettuce yield in 1994 and the
side shoots of lettuce in 1995
(Fig. 2). These phenomena
lead to the conclusion,
that the horn silica treatment
has an inhibiting effect on the
early plant development
vegetative youth development
can work. The interpretation
of KLETT (1968) that
Early horn silica treatments
promote growth during the
application period, that is
possibly one too
Reinforcement of the vegetative
growth compared to that
You can bring about
generative growth with your own
Results for bush beans
and lettuce not confirmed
become. In comparison, the
early horn silica treatment
reduced the amount in the 1994 trial year
for untreated control
and the late Hornkiesel
treatment reduces the leaf yield
of the salad (Fig. 2). THUN
(1967) observed early in horn
silica treatments
to plant development
Carrots and beetroot one
significant inhibition of the
Growth of leaves in
Comparison to untreated
Control. The growth inhibition
of the leaves did not have a
negative effect on them
Root formation.

Late additions of horn silica
increased the amount in KLETT (1968).
Yield and TKG of oats
and wheat compared to
Control. Late treatments
promoted maturation
the potato tubers. This fact was
evident
on crude protein content, on
relative protein content
the protease activity and am
Vitamin C content of potato
tubers. VELCRO (1968)
concluded from these test
results that late horn silica
treatments slow down the
maturation phase of the plants
support financially. Higher yield,
better maturation and higher
Thousand grain weight as a
result of later horn silica
treatments at KLETT (1968)
are in accordance with
the present results show
delayed aging of the plants

as a result of later horn silica
treatments led to a longer
maturation phase.

In studies by
WISTINGHAUSEN (1979).
Horn manure treatments late
in plant development
(Horn pebbles 2 x in July and 1
x in August) for carrots
contributes to a higher leaf yield
the harvest. The senescence of the
There were already a lot of leaves
during harvest in these experiments
far advanced. The higher leaf
yield later
Horn silica treatment can
with delayed senescence
Leaves are explained. The
Death of the leaves is considered
Indicator of maturity stage
the carrots. The carrots
treated with horn pebbles
and horn manure showed defiance
lower root/leaf ratio, higher
ingredients and higher
storage properties

physiological maturity than that

untreated plants. The
Test results are available
in accordance with the
own experiments with higher
chlorophyll contents
Bush bean leaves at the
maturity (Fig. 3) and one
higher leaf yield in lettuce
(Fig. 2) as a result of later horn
silica application.

Observations in agricultural practice
Horn silica treatment of
Runner beans showed that
the leaves darken as they ripen
and stayed green longer than
in untreated plants
(REMER 1968, LOHRMANN 1932,
KABISCH 1934, VOEGELE 1937,
LEIHENSEDER 1953). Only at
LEIHENSEDER (1953) is the one
Time of application of
Horn pebbles are adequately
documented. The horn silica
treatment was carried out by this one
Author made late in plant
development.
According to observations by
THUN (1967) delayed late
Horn pebble applications too
for winter cereals, the ripeness
compared to the control.
For extremely frequent horn
pebble applications (8 to
12 sprays) could one
delayed aging in the leaf area
of almost all examined
Plant species are observed.
THUN (1980) observed
In addition, horn silica
treatments are available for strawberries
and after the harvest to one
intensive leaf growth
led. These observations
from agricultural
Practice is in accordance with
our own test results

with later application of horn
pebbles to the bush bean leaves
were noticeably darker green
and the senescence of the
Planting was delayed.

Conclusions

Horn silica treatments early
in plant development
(Beans: 2nd leaf; lettuce:
7th to 9th leaves) greatly
reduced growth in the area
vegetatively influenced youth
development; late horn silica
treatments (beans:
before flowering and for pod
formation; Salad: at 70 – 80%
the duck size) delayed the
Senescence and prolonged
the maturation phase. This
Facts can be considered one
balancing effect of
Horn pebbles on one-sidedness
during earlier and later
Stages of plant development
can be interpreted. The
Plant reactions to horny silica
applications early and
late in plant development in
our own experiments
agree with the observations of
LEIHENSEDER (1953),
THUN (1967, 1980), REMER
(1968) and VELCRO (1968)
agree. The interpretation,
that early horn silica
applications stimulate the vegetative
Promoting growth contradicts
the experimental results
observed here.

In summary, they worked
Horn pebble applications
compensating for:
one-sided environmental
conditions throughout plant
development, which is visible
is sent to the rectified
Plant reactions after early and
late application of horn silica
compared to
Control for 71% of the
parameters with significant
differences in FRITZ (2000);
by the time of
Application probably also
specific to one-sidedness in
early and late stages of
development.
With a variation of the time

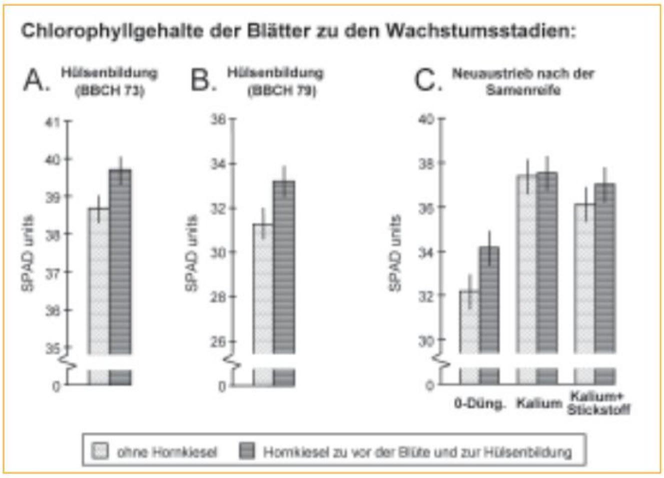

Fig. 3: Bush beans: Hornkiesel works, among other things, through the chlorophyll content:
Chlorophyll content (SPAD units*) of the leaves in the growth stages of pod formation (A, B)
and chlorophyll contents of all leaves during re-emergence after seed ripening (C). A:
Vessel experiment in 1996 with soil from biodynamic farming. B: vessel test
1997 with soil from organic and conventional cultivation. C: Vessel test 1997
with soil from biodynamic farming. * Measurement with Minolta SPAD-502.
Vertical lines: Limit difference ÿ = 0.05 for the statistical comparison between the
columns that stand together.

point of horn silica application
early and late in the
Plant development can
partly modifying
the respective stages of the
Plant development can be
influenced.

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