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Taifun Soy Info

Taifun Zentrum für Sojaanbau

Specialist information for soy producers and processors

Soak test for soybean seeds

A simple means of quality control - from seed harvest to sowing

Figure 1: Vital seeds are the basis of successful soybean cultivation. Poor germination capacity can delay emergence and growth by several days, while the weeds grow unperturbed.

Inadequate quality of soybean seeds is a major issue every year. In many cases the legal requirement of 80% healthy seedlings is not met. In times of need, lots with a germination capacity of less than 75% have already been approved to make-do. However, 90% healthy seedlings, as is standard in the USA, are desired.

It is always noticeable that the germination capacity of some seed lots can drastically decrease within a few months in storage, while for others it remains largely intact. After the harvest, the store is well stocked with what we expect to be excellent soy seeds – yet when it comes to packaging and certification in late winter, the rude awakening arrives. The vitality of the seeds, which can vary considerably between individual batches, is also decisive for a good development in early growth stages and weed control.

The difference between batches that survive "healthy" and those in which the germination capacity collapses often lies in the seed coat. Small cracks, not visible at first sight, lead to air ingress and thus to accelerated aging of the seeds; abnormal germination and reduced vigour are the result. The seed coat of soy is particularly sensitive. Especially after threshing a very dry crop (<13% grain moisture), the proportion of damaged seed coats increases with each processing step and each decanting. An intact seed coat is also absolutely desirable for soybeans for food production, as it protects the valuable ingredients.

The soaktest is a simple and proven method, widely used in North and South America, to visualize damage to the seed coat immediately during harvest or processing. By fine adjustment of the combine harvester and cleaning, the soybean can be treated more gently. This can often prevent considerable loss of quality. The test is also used to test processing plants, sowing machines, etc. for their suitability for soy.

Execution of the test

Materials required

The most impressive feature of the soaktest is that it can be carried out independently of time and place with the least amount of material. The result is available after 10 minutes. Only the following is required:

• water
• 3 flat vessels
• a representative soy sample representing the lot to be tested.

Implementation

1. Three times 100 whole soybeans are counted from the soy sample.

Figure 2: The greatest effort in the soaktest is the counting of the 100 beans. A simple bean counter can help.

2. 100 seeds are placed in each of the three vessels and covered with water.

Figure 3: To obtain meaningful results, it is recommended to always test 100 beans three times.

3. After 10 minutes the water is carefully poured off and the beans are sorted.

Figure 4: Beans with relevant damage in the seed coat can be clearly distinguished from intact or slightly damaged beans after 10 minutes in water.

• **Beans with relevant damage to the seed coat absorb water and thus double or even triple their size** (Fig. 4: top left in the picture). These beans are called "water absorbers". Also beans which have formed a water bubble under the seed coat on only one side and beans which have completely lost the seed coat or which broke during soaking are counted to this category.

• Beans with slight wounds have become wrinkled, but have no water stored under the seed coat (Fig.4: top right in the picture).

• Perfect beans are unchanged after the ten-minute soaking (Fig.4: bottom of the picture).

In America, household bleach containing hypochlorite is often added in a ratio of 1:5. This reduces the soaking time to approx. 5 minutes. The quality of the result remains the same. For environmental reasons, however, such bleaching agents are no longer common in Europe.

Evaluation of the results

The proportion of water absorbers correlates strongly with the proportion of beans that form abnormal seedlings after storage, provided that the seed quality is not already affected for other reasons such as fungal diseases. Therefore, a proportion of less than 10% of water absorbed should be aimed for. The best seed lots in the Taifun contract farming have 2-3%, but lots with up to over 50% are still not uncommon. An approval as certified seeds can then no longer be expected; until spring the germination capacity usually drops dramatically. Water absorbers break more easily under mechanical stress than intact beans. Beans which are slightly wrinkled after the soaking test can be classified as acceptable. Usually they retain their germination capacity.

To verify the value of the test for our own contract farming, we have subjected all Taifun seed lots from the 2013 harvest to a soaking test in addition to the regular germination test. Immediately after harvesting, no correlation was found between the number of water drawers and abnormal seedlings. For delivery in spring, however, the lots with many water drawers contained significantly more abnormal seedlings than the intact ones. The sample size was relatively small and further tests are planned for the upcoming harvest. However, the trend can be observed again and again in practice. While batches with a few water drawers can produce poor germination results for other reasons, it is rare that batches with many water drawers show acceptable germination capacity.

Opinions from the practice

During the research for the soaktest we interviewed a number of farmers and processors in North and South America:

• **Thierry Gripon, owner of the soybean breeding company SG Ceresco, Quebec, Canada:** "The soaktest is routinely used by us for rapid quality control of all soybean seed lots. We also use the test for rapid quality control of consumer soybeans because cracks in the grain through which air enters also have a negative effect on the ingredients."

• **Harro Wehrmann, Wehrmann Grains and Seeds, Canada:** "After the harvest we do a simple germination test. In spring before sowing, a cold test follows (7 days at 8°C). I do not actually use the soaktest. I know my machines. Essentially, the germination capacity is maintained by harvesting and storage at approx. 15% moisture, which works great thanks to the cold winters in Ontario with sufficient ventilation".

• **Emerson Fey, Professor at the Agricultural University in Marechal Cândido Rondon, Paraná, Brazil:** "We use a 13% sodium hypochlorite solution from the supermarket for the soaktest. It is mainly used for the adjustment of seed harvesters, but occasionally also for the adjustment of sowing machines. I am not aware of any use for consumer soybeans."

• **Dr. Kristina Bachteler, responsible for the laboratory of the Taifun center for soybean:** "The soaktest does not replace any of the conventional examination methods. It serves as a simple tool to get an impression whether your settings are correct."

Conclusion

The soaktest is an interesting means of quickly and easily checking the suitability of equipment and equipment settings for processing soybeans. It is hoped that the test will establish itself among domestic soybean seed producers and producers of quality soybeans for the food industry in order to avoid unnecessary quality losses in the future, especially due to incorrect threshing settings.

The test gives a rough indication. It happens that lots with very good soaktest results have poor germination capacity or that despite many damaged seed coats, acceptable germination capacity is still present even after longer storage. For the final evaluation of soy seeds, germination tests according to the ISTA standard, which are already offered in several German seed laboratories, are of course indispensable. To what extent the soaktest is also suitable for other grain legumes would have to be examined.

Links to the topic

http://www.youtube.com/watch?v=BwMNcMamO60
Video of the South Dakota State University for the practical implementation of the test

http://www.seeds.iastate.edu/seedtest/images/Seed%20Soak%20Pamphlet.pdf
Seed Laboratory of the Iowa State University for the performance and evaluation of soaktests

For comprehensive information on all aspects of soy cultivation visit:

www.sojafoerderring.de

Imprint
Author: Fabian von Beesten
Editorial assistance: Martin Miersch
Publisher: Taifun-Tofu GmbH
Bebelstraße 8 | 79108 Freiburg |
Tel. 0761 152 10 13
soja@taifun-tofu.de

Zentrum für Sojaanbau

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Translation: Stefan Paul

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