Purple Moor-Grass

Comminution of Molinia Caerulea

Molinia are a genus of the family of sweet grasses
Especially in northern Germany occurs the Purple Moor-Grass (*Molinia Caerulea*). The popular German name – *Pfeifengras* (pipe grass) - derives from the use of the hard stalks as pipe cleaners.
Interesting for research are the absolute contents and the ratios of carbon and nitrogen in the plant material. For the determination of these values mostly carbon and nitrogen analyzers are utilized.

Fig. 1: Purple Moor-Grass Molinia caerulea

Test with the Variable Speed Rotor Mill
For milling purposes, dried and pre-crushed grass was supplied by the customer. Clearly visible are the name-giving hard blades of grass.
The requirement of the task was that the material shall be smaller than 0.2 mm. The prospective customer selected the **Variable Speed Rotor Mill PULVERISETTE 14 *classic line*** as the instrument for the job.
Complying with this demand, the mill was equipped with a 0.2 mm sieve. The result is not satisfactory. Several blades of grass remained intact in their full length.

Fig. 2: Dried Purple Moor-Grass

Grinding with a 2 mm sieve
Due to the centrifugal acceleration of the mill an air current develops, which moves the blades of grass lengthwise through the sieve. The PULVERISETTE 14 was now equipped with various finer sieves and the material processed.
The results remained unsatisfactory.

Fig. 3: Comminuted Purple Moor-Grass

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Optimized grinding process the with impact bar

For the optimization of the comminution, a so called impact bar is available for this mill. With this, long, fibrous particles can be broken down well.

The next test was therefore performed with the impact bar and a 1 mm sieve. With it, optically, a pretty good result was achieved here. Now the hope existed, that in a second step, by utilizing a finer sieve the desired end fineness could be achieved.

Fig. 4: Impact bar and 1 mm sieve

Utilizing the impact bar and 0.08 mm sieve

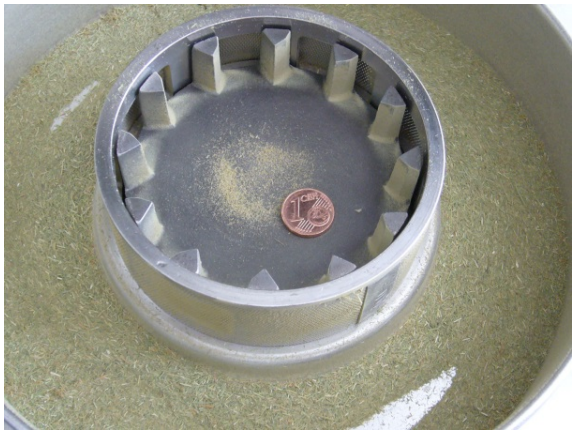

Fig. 5: Impact Bar and 0.0 8 mm sieve

Fig. 6: Ground sample - 300 mg initial sample weight

Is the impact bar with a 0.08 mm sieve inserted, oblong particles are still clearly visible though. For a initial sample weight of 300 mg, for the classic analysis, this fineness is sufficient. The right photo shows 300 mg.

Comminution Planetary Micro Mill PULVERISETTE 7 *classic line*

The carbon nitrogen analyzers only work with 20 mg net weight though. This immediately raises the question for an even finer prepared sample. The solution was found with the **Planetary Micro Mill PULVERISETTE 7 *classic line***.

For tough, elastic materials for example hair, we mostly recommend to use sintered corundum bowls and balls. For the described application, bowls and balls made of hardened steel were proven to be better though.

Test with grinding set made of sintered corundum

For the first test, the base sample (not additionally comminuted), was added into the sintered corundum bowl and milled for 20 minutes. Afterwards the grass had been ground down to a homogenous fine powder.

Since the sample amounts which are to be added into the bowl are relatively small, a pre- comminution of the samples with the Variable Rotor Speed Mill and impact bar and a 1 mm sieve are in regards to the representativeness recommended.

Fig. 7: Purple Moor-Grass in a grinding set made of sintered corundum

Comminution with a steel grinding set

In additional tests with the Planetary Micro Mill PULVERISETTE 7 *classic line,* pre-crushed material was added and the steel grinding set used. After 10 minutes the grass was ground into powder like shown in the photo here. Are 20 mg of this sample weighted in, it safely can be assumed, that a representative sample is added to the measuring instrument.

Fig. 8: Purple Moor-Grass ground to a powder

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