Starch potatoes

Good ventilation for long-term storage

Starch potato producers are increasingly forced to store their crop. In order to ensure good conservation, several measures must be taken, including ventilation of the heaps.

Thorough cleaning of tubers on the farm helps to discard poor quality ones.

Structural changes in the starch potato sector have forced potato growers last year to start storing their crop for longer. Particular care must therefore be taken regarding storage conditions, in order to guarantee good long-term conservation of the stored product.

Caution at harvest time

When conditions throughout the growing season have encouraged the development of diseases (late blight, Erwinia…), it is better to identify risk areas within fields before harvest: where symptoms of disease on plants were most prominent, where spraying gaps occurred, in cases of particular leaf damage (road side, sprayer tracks) or prolonged accumulation of run-off water… Regarding the globally late maturity of the starch cultivars and the late harvest period, it is preferable to only channel crops from the healthiest fields or healthiest parts of fields towards long-term storage.

In extreme cases, it is even advisable not to harvest the few square metres of semi-permanent “wet spots”, in order not to mix the tubers coming from those areas with the rest of the batch.

As a general rule and as far as this is feasible, lifting of crops destined for long-term storage should be given priority in good harvesting conditions. In order to avoid a heavy soil tare in bulk, which impedes good air flow distribution through the tubers, clods separating equipment should be used: it protects tubers from damage while achieving good results in the field, depending on how easy it is to screen the soil. The easiest option is to select a screening web with a wide enough pitch (to be adjusted according to crop grading so as not to lose too many tubers and avoid then volunteer growth in subsequent crops). ,It is also possible to opt for effective devices at the tail end of the harvester to separate earth and discard haulms. Dahlman rollers usually give good results in heavy damp soils. However, the tubers must part easily from the haulm (maturity, chemical haulm destruction) to save them being caught and damaged by the rollers.

Tuber dusting with CIPC on the conveyor belt as the heap is being formed, achieves a simple and effective sprout control treatment if required

The earth separation process can be carried out again more thoroughly back at the farm, and complemented by a visual inspection in order to discard flawed tubers which are likely to create focuses of infection in the heap. In this case, three precautions should be taken:

- adjust the operating speed of the reception hopper and potato cleaner, so that tubers are laid out in a single layer on the inspection table,
- enough people must be available to ensure effective sorting, depending on intake throughput (table width and forward speed of conveyor belt), and be positioned along the whole length of the sorting table,
- ensure good lighting straight above the inspection table so that symptoms can be easily identified and save staff straining their eyes (minimum recommended lighting: 200 lux).

After reception, the residual earth tare must be spread out as evenly as possible throughout the bulk to avoid creating hot spots which will be difficult to control, even with appropriate ventilation.

Installing ventilation may seem costly but it is quick recovered through the reduction in the number of lost tubers during storage.

Cooling ventilation: the right solution for a successful drying process

The only way to stop any infection focus from spreading through the bulk is to ensure effective ventilation. This requires low pressure type fans. They are designed for potato storage, with high ventilation capacity (air flow: 100m^3/h per stored m^3), blowing through an appropriate air distribution system : over or under floor ducts with decreasing sections at well thought-out intervals to produce even aeration over the whole width of the heap (lines every 3.5 to 4 m recommended for over floor ducts).

If it is a new installation, the level of investment may seem high compared with the sale price of the raw material, but the stakes here are of a strategic nature: ventilation helps to dry the tubers quickly after lifting, to avoid the spread of bacteria as well as, while steadily cooling the heap, to slowly dehydrate rotten parts and reduce sprouting pressure. For around 100 tonnes of tubers, the investment (12 to 15€/t, overhead air ducts, control included) is equivalent to losing a 25 tonnes lorry load.

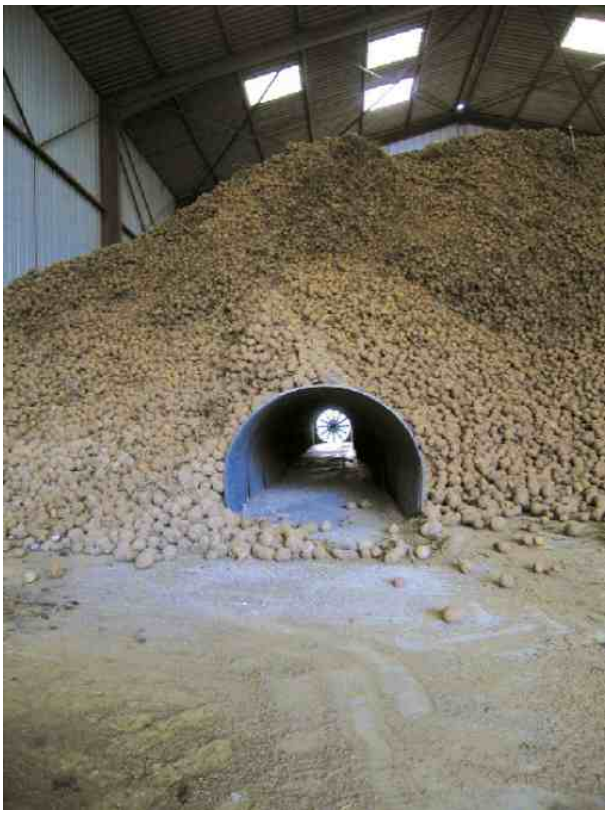
When implementing the ventilation process, the following simple principle of cooling ventilationl should be followed : only keep the fans running when the external air introduced into the heap is colder than stored tubers. Following this principle and controlling rising temperatures in the bulk will ensure steady drying and achieve reliable quality in the long term.

This principle is based on the fact that air temperature and humidity are two factors linked: when aerating with colder air, external air will always contain less “true water” than the saturated atmosphere (relative humidity - RH near 100%) present in the middle of the heap of tubers. As it travels through the heap, the air warms up while cooling the heap and evacuating excess humidity compared with its initial level. *(figure 1)*. Following this basic principle, aeration can take place even when the weather is damp, when it rains or even when it is foggy! There is only one evident obligation: the installation must be fitted with reliable temperature sensors. The time slots when aeration is possible should also be fully used, to ensure effective results. For this objective, the minimum necessary equipment is one external temperature sensor and two tubers temperature sensors (at least one per 200 tonnes stored), buried around 60 cm deep from the top of the heap. In connection it’s preferable to use a basic electronic control supervisor to start automatically the ventilation when external temperatures are available. This is a logical and pragmatic solution to ventilate safely and effortlessly at favourable periods.

Reliable sensors and automatic control make the cooling ventilation process easier.

Help is available for producers

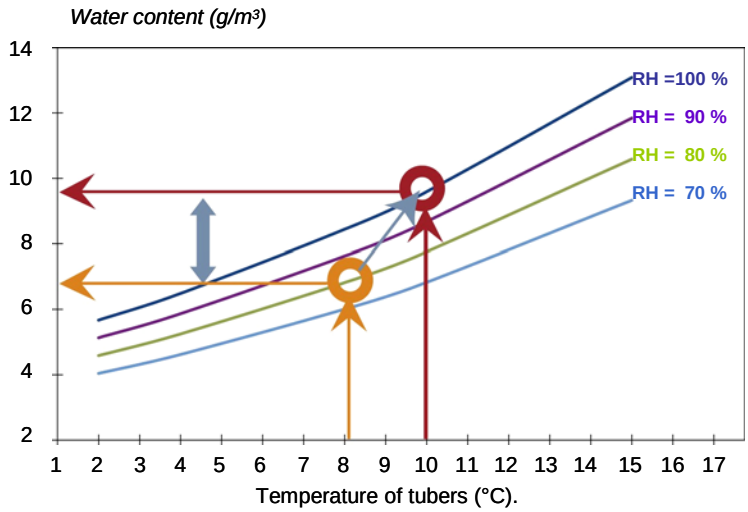
A technical help is available on line for starch growers: in March 2007, ARVALIS-Institut du végétal launched a special Internet service available free of charge, called *“Proper ventilation of starch potatoes”*. It helps producers to size their installation properly (how to equip a starch potato store for long-term storage, what capacity of fan to choose, how many air supply ducts should be planned…).
Its URL is:
http://www.arvalisinstitutduvegetal.fr/fr/ventilationfecule.asp



Appropriate and well-managed ventilation ensures successful long-term storage.

If possible, this cooling ventilation process has to be triggered as the heap is being formed, blocking, if need be, the open end of the air ducts at the vertical level of the top heap face, and adapting the temperature differential to the external cold air supply: reducing it if temperatures remain mild. With proper ventilation management, based on the principle of cooling ventilation, the heap is completely dry once the tubers placed 25 to 30 cm from the top of the heap are dry.

Principle of drying a bulk by cooling v *(fig. 1)*



A heap of wet tubers at 10°C has a saturing RH of 9.6 g of water / m3. By using air 2°C cooler at a level a of 80% RH containing 6.8g of water/ m3, the heap can be dried by 2.8g of water/aerated m3, i.e., at a rate of 100 m3 / h per m3 of potatoes, 0.28 litre of water / stored m3 per hour (or nearly 0.5 litre of water / stored tonne). If ambient air had a RH of 100% (rain or fog), and was still at 8°C, it would “only” contain 8.4g of water / m3 and would still be able to dry the heap! Only the efficiency of the drying process would be affected: only reduced by 1.2g of water / aerated m3.

Sprouting control for long-term storage

Usually the regulation of cold temperature and dry condition in store combined with long dormancy cultivar is sufficient for a good sprout control during 3-4 months. A sprout control is only necessary for the longest term storages and for varieties with short dormancy (like Amyla, Centaure, Hinga, Producent, Taranis). For crops harvested from plants that were not treated with maleic hydrazide in the field, the easiest and cheapest solution is to apply CIPC while the heap is being formed, at a rate of 5 to 10 ppm. The product should be applied as uniformly as possible like, fpr example, over the supplying belt.

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From Perspectives Agricoles n° 343 March. 2008