



Harvesting, curing and storing



Harvesting conditions

- Lift the onions when approx. 60% of the tops are down.
- Only top and lift the onions if they are wind dry.
- Always remove the leaves above the last point where they start to form the hollow leaf shaft, this is about 10 cm above the bulb. Cutting the tops too short and lifting and harvesting damp crops considerably increases the risk of neck and wound rot.

Ventilation capacity

- Minimum ventilation capacity 150 m³ air/ m³ onions/ hour; this means that an air capacity of approx. 30,000 m³ air/ hour is required for 100 tons of onions. Adapt the fans accordingly. To obtain the best drying results using heaters, a heater capacity of 60,000 to 80,000 Kcal/100 tons of onions is the optimal requirement.
- Create a pile of onions no higher than maximum 4 metres. At a depth of 1.5m in the pile, insert a temperature sensor immediately above an air inlet duct.
- The quicker the neck of the onion dries out, the less risk there is of mould and bacteria developing in the onion bulb. This will ensure better quality onions. This is contrary to the belief that drying the neck of the onion too quickly will close the neck. However, the neck must be sufficiently long.

Relative humidity

- To obtain the maximum drying effect, the RH of the air exiting the storage unit must be 65% during the first three phases of curing.

During storage the RH may increase to 80%.

- Gas-fired heaters produce less moisture and the temperature is easier to regulate than petrol-fired heaters.

Choose a pile temperature of 20°C if:

- due to weather conditions the onions were harvested too late and the foliage has mainly died off in the field,
- there is insufficient heater capacity to reach a temperature of 30°C,
- the air inlet temperature is maximum 22°C.
- If the average temperature over a 24-hour period is lower than 16°C, apply an air inlet temperature of the average temperature of a 24-hour period plus 4°C.

Choose a pile temperature of 30°C if:

- the harvested lots are green, i.e. approx. 60% of the tops down,
- if you think it is important to control neck rot infections, raise the temperature to 30°C as quickly as possible. This helps avoid the risky 22-25°C range in which the neck rot mould develops quickest. To save fuel half close the outer shutters at night.
- there is enough heater and fan capacity present,
- the outside temperature is above 22°C when the onions are being put into storage and cured,
- the air inlet temperature is maximum 32°C.

RH sensor

- An RH sensor linked to the storage computer will help achieve maximum drying effects for lower energy costs - and may contribute to improved colour and shelf life.
- Set the RH to 65% on the computer when putting the onions into storage.
- Raise the RH to 80% for the later stages of curing

Inspecting the pile

- If you walk over the pile it should rustle and you should sink into it slightly
- Inspection measures: cut an onion in half and place it on top of the pile. If mould starts to grow on the cut surface you need to increase the ventilation.



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Curing and storing onions in four stages

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First period: curing

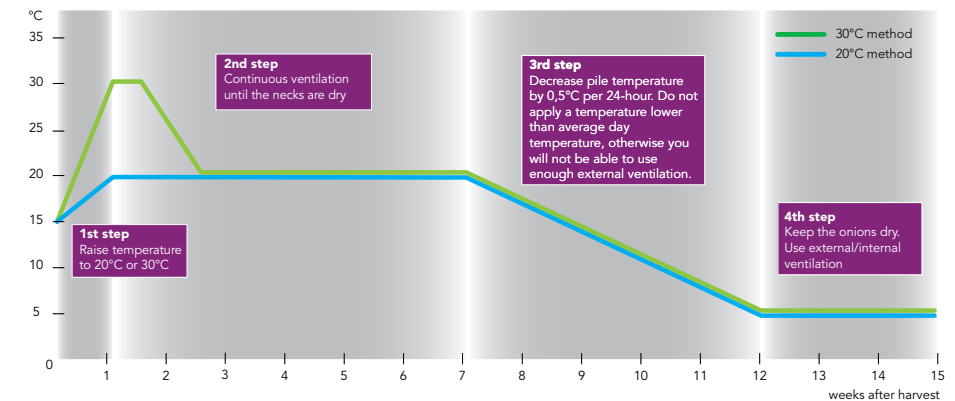
- Keep the air inlet temperature constantly 2 to 3°C higher than the pile temperature.
- With the 30°C programme only lower the temperature after four days when the onions at the top of the crate are also 30°C.
- Then decrease the temperature by 0.5°C per 24-hour period to 20°C.

Second period: maintain temperature and post-dry the onions

- Keep temperature constantly at 20°C, using heaters if possible.
- Continue with constant external or internal ventilation, until the inner layer of the outer skins feels dry and firm.

Third period: reducing the temperature

- Decrease by a further 0.5°C per 24-hour period.
- For the maximum drying effect, ventilate during the day time as much as possible.
- Do not apply a temperature that is too low for the time of year, otherwise you will not be able to use enough external ventilation.



Fourth period: storage period

- Once the onions have been brought to storage temperature, ventilate for 8-9 hours per 24-hour period for the next 6 weeks.
- Then continue to ventilate (externally or internally) for 4 hours per 24-hour period.
- Avoid temperature fluctuations; it is better to have dry onions than have a too low temperature in the crate.
- Do not let the pile temperature drop below 6°C if cooling is done using outside air!



		Temperature of outside air/inlet air in °C																			
		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
Pile temperature in °C	3	93	87	81	76	71	66	62	58	54	50	47	44	42	39	36	34	32	30	28	
	4	+	93	87	81	76	71	66	62	58	54	50	47	44	42	39	36	34	32	30	
	5	+	+	93	87	81	76	71	66	62	58	54	50	47	44	42	39	36	34	32	
	6	+	+	+	93	87	81	76	71	66	62	58	54	51	47	45	42	40	37	35	
	7	+	+	+	+	93	87	81	76	71	66	62	59	54	51	48	45	42	40	37	
	8	+	+	+	+	+	93	87	81	76	72	67	62	59	54	51	48	45	42	40	
	9	+	+	+	+	+	+	93	87	82	76	72	67	63	59	54	51	48	46	43	
	10	+	+	+	+	+	+	+	93	87	82	76	72	67	63	59	55	52	49	46	
	11	+	+	+	+	+	+	+	+	93	87	82	77	72	67	63	59	55	52	49	
	12	+	+	+	+	+	+	+	+	+	93	87	82	77	72	68	63	59	56	53	
	13	+	+	+	+	+	+	+	+	+	+	93	87	82	77	72	68	63	60	56	
	14	+	+	+	+	+	+	+	+	+	+	+	93	87	82	77	72	68	63	60	
	15	+	+	+	+	+	+	+	+	+	+	+	+	93	88	82	77	72	68	63	
	16	+	+	+	+	+	+	+	+	+	+	+	+	+	93	88	83	77	72	68	
	17	+	+	+	+	+	+	+	+	+	+	+	+	+	+	93	88	83	77	73	
	18	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	93	88	83	78	
	19	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	93	88	83	
	20	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	94	88	

Maximum permitted RH of inlet air in %.

Example 1:

- Pile temperature is 16°C. Outside air is 15°C. Ventilation can take place irrespective of the relative humidity level of the inlet air.

Example 2:

- Pile temperature is 16°C. Outside air is 18°C. Before ventilating measure the relative humidity of the inlet air. Ventilation is possible if the RH is 88% or lower. If the inlet air has an RH higher than 88% do not ventilate using outside air, as this will cause condensation.