



# Cultivation of second year Quality inside onion sets

**First year onion sets are cultivated from seed, and are planting material for second year bulb onion cultivation. The main reason for using onion sets for bulb production is that the crops are earlier to mature than those grown from direct drilling but there are also other advantages. For example, yields of crops grown from sets tend to be higher, the bulbs are larger, they have a higher dry matter, (which is useful for processing), and are able to establish well under poor conditions when compared to crops grown from seed.**

Onion sets are also less sensitive to day length than direct drilled onions; thus onion set varieties can be used further North than the same variety grown from seed.

In the Netherlands, onion sets can only be supplied according to the rules of the onion sets regulations, which are controlled by Naktuinbouw. These regulations are the base of the Quality Inside onion set programme.

Quality inside onion sets are kept under optimal storage conditions right up to the moment of dispatch. However, the quality of the produce will deteriorate if it is not handled correctly during loading, transport and on arrival. We advise using climate- controlled vehicles to avoid temperature fluctuations during transport which could cause condensation. Good ventilation and the shortest possible transit time are very important. On arrival the produce should be stored in a dry, well-ventilated and frost-free storage unit, preferably in ventilated crates. It is also important to keep the period between the arrival of the sets and planting as short as possible. We also advise you to instruct the transport company/driver to check the transport documents for accuracy.

## Soil

Various types of soil are suitable for cultivation of second year onion sets. An early, well drained and warm soil is important. Sand: pH > 5,5. Soil must be free of White Rot (*Sclerotium cepivorum*) and stem nematodes. Use a soil rotation of minimal 1:5. Autumn ploughing prior to pre planting cultivation can be beneficial.

## Nutrition

It is very important to use a soil sample as the basis of your nutrition plan. The advice below is only a general guideline. Contact your crop advisor or Bejo representative for a more specific nutrition advice.

### **N :130-150 kg. N/ha before or after planting**

Onion sets require more nitrogen than seed onions. Accurate application is important; too much nitrogen will result in a late harvest.

### **P<sub>2</sub>O<sub>5</sub> :100 kg P2O5/ha depending on soil analysis**

Phosphate is an important nutrient for onions. The high quantity is to stimulate root growth.

### **K<sub>2</sub>O :200 - 250 kg K2O/ha depending on soil analysis**

Potash is mainly required to promote skin firmness and quality. As a result of a low potash availability and uptake there could be a major yield penalty.

## Onion Set Size Grades

Size	Diameter (mm)
1	10/14
2	14/17
3	17/21
4	21/24



## Transplanting

- In autumn: transplanting from about September 15th.
- In spring: transplanting when weather and soil conditions are suitable (February - March). It is important that the planting material is stored dry and is continuously ventilated.

**Table 1: Set planting rate (number per hectare), with varying row width and in-row spacing**

rows per bed	12 sets/m <sup>1</sup>	14 sets/m <sup>1</sup>	16 sets/m <sup>1</sup>	18 sets/m <sup>1</sup>	20 sets/m <sup>1</sup>	22 sets/m <sup>1</sup>	24 sets/m <sup>1</sup>
4 rows	320.000	373.333	426.667	480.000	533.333	586.667	640.000
5 rows	400.000	466.667	533.333	600.000	666.667	733.333	800.000
6 rows	480.000	560.000	640.000	720.000	800.000	880.000	960.000

## Calculate the number of onion sets to be planted per ha

In table 1 you can calculate the amount of onion sets to be planted per ha. On the vertical line you can choose the number of rows per 1.5m bed (wheel centre to wheel centre). Then choose, on the horizontal line, the number of onion sets that you wish to plant per linear metre of row. At the point where both lines cross you can read the number of onion sets to plant. Example: suppose you have 5 rows per bed and you wish to plant 20 onion sets per metre. The result will be 666.667 onion sets per ha.

**Table 2: Amount of kilos to be planted in relation to set size, number of sets per kg and number of sets per hectare**

set size	number of sets per kg	number of sets per hectare									
		300.000	400.000	500.000	600.000	700.000	800.000	900.000	1.000.000	1.200.000	1.400.000
10/14	625	480	640	800	960	1.120	1.280	1.440	1.600	1.920	2.240
14/17	350	857	1.143	1.429	1.714	2.000	2.286	2.571	2.857	3.429	4.000
17/21	190	1.579	2.105	2.632	3.158	3.684	4.211	4.737	5.263	6.316	7.368
21/24	120	2.500	3.333	4.167	5.000	5.833	6.667	7.500	8.333	10.000	11.667
10/21	320	938	1.250	1.563	1.875	2.188	2.500	2.813	3.125	3.750	4.375

With table 2, you can calculate the accompanying amount of kilos to be planted in the different sizes. Example: the above example shows that you have to plant 666.667 onion sets. In the 10/21 mm bracket you will need between 1.875 and 2.188 kg onion sets (2.087 kg to be precise). The number of onion sets per kg can deviate 5% either way.

## Planting

Distribute the onion sets evenly along the furrows. Don't drive too fast; accurately set your machine and use dry onion sets. When you receive your onion sets, check whether they are dry enough and, if not, dry them further in crates. The more densely you plant your onion sets, the earlier they will be ready to harvest. A lower density will lead to a later maturing crop and bigger onions. Most growers stick to a density of 15 to 25 onion sets a metre (in the case of 5 rows in a bed of 1.50 m). While planting, count the onion sets to check your planting density. Cover the onion sets with 3 to 4 cm of soil.

## Weed control

Weed control can be done mechanically and chemically. Herbicides can be used on the production field before and after emergence. Before using any herbicide, make sure that you know all about its use, e.g. its action on weeds and crop, safety periods, method and rate of application. If in doubt, consult an agronomist for guidance.

## Harvest

Harvest of onions occurs when 2/3 of the foliage has fallen over. Depending on the harvesting equipment used, the foliage can be removed before or during the lifting of the onions. Topping of onions under humid conditions may increase the risk of infection of Neck rot (*Botrytis allii*). The onions can be lifted and stored immediately or left in swaths in the field for a few days to dry. Depending on the crop and weather forecast, the onions can remain in the field, or be lifted.

Autumn transplanting: harvest period May-June

Spring transplanting: harvest period July-August



## Storage

The conditioning of the onions for storage needs great care and attention to maintain the quality. Each year has difficulties during the cropping period, which need extra attention during storage. We advise gradual drying at not too high temperatures. When the onions are brought in, drying at 30°C is recommended. Continue this until it is possible to roll the neck of the onions between your fingers, or the onions are “rustling dry”. After drying, ventilation on a regular base is necessary to prevent fungi growth. It is not recommended to heap onions more than 3.5 meters high because of the ventilation capacity. Post drying occurs after 2-3 weeks ventilation or through a reduction of temperature by 0.5°C per day until a temperature of 4°C is reached at the end of December (for long storage use).

## General tips to prevent Neck rot

**Pre harvest:** avoid damaging the leaves in the field, for example machinery, fungal infections and thrips damage.

**During harvest:** when topping the foliage, remove the leaves above the last point where they start to form the hollow leaf shaft. This is about 10 cm above the bulb neck. Do not lift damp plants. After harvesting, if the weather is dry, the onions can remain in the field for a few days.

**In storage:** dry the onions in a controlled manner on a slatted floor or in crates. Make sure there is sufficient ventilation and air movement. The risk of Neck rot infection and development is when the temperatures are between 22°C and 25°C. It is very important to keep this risky period as short as possible.

*If the outdoor temperature is low,* dry the onions using an air temperature just below 22°C. when the onions are dry, rapidly take the temperature above 25°C. Set the inlet temperature 3 degrees higher than the pile temperature. Then keep the temperature of the pile at 30°C for 4 days. This will destroy any neck rot fungus present. Then allow the temperature to drop by 0.5°C per 24-hour period until it reaches around 20°C. Make sure that the inlet temperature during drying never exceeds 32°C!

*If the outdoor temperature is high,* make sure the temperature of the onions is immediately taken to above 25°C. Set the inlet temperature 3 degrees higher than the pile temperature. Then keep the temperature of the pile at 30°C for 4 days. This will destroy any neck rot fungus present. Then allow the temperature to drop by 0.5°C per 24-hour period until it reaches around 20°C. Make sure that the inlet temperature during drying never exceeds 32°C!

NB: The very early onion sets in particular are harvested when they still have relatively large amounts of green foliage. This requires a greater ventilation and boiler capacity than sowing onions. If you lack the experience, or have any doubts about how to dry onion sets, have a ventilation specialist examine and calculate the capacity of your facilities.

## Major onion pests and diseases

- **Downy mildew (*Peronospora destructor*) fungus**  
Symptoms are most evident early in the morning when dew is present. A furry growth on the leaf surface will develop. Infected leaves become bleached and collapse. An epidemic occurs if humidity remains high.
- **Botrytis Leaf Blight (*Botrytis squamosa*) fungus**  
Can be identified by its small, white spots with a light green halo. The leaf will break at right angles to the lesion when pressed together. This disease mainly occurs towards the end of the growing season and is especially prevalent on old leaves.
- **Neck rot (*Botrytis aclada*) fungus**  
Bulbs generally have a soft neck. After cutting one open it can be seen that the scales are turning brown, grey or black from the neck. Sometimes a white to grey coloured fungal growth can be seen.

For further information, refer to the Bejo-De Groot en Slot publication “Major onion pest and diseases”. This publication can be ordered by your representative.

Before using any chemical, make sure that you know all about it's use, e.g. it's action on weeds and crop, safety periods, method and rate of application. If in doubt, consult an expert or a technician for guidance.

**This information is based on Dutch conditions**