

## Valorising European Research for Innovation in Agriculture and Forestry



### VALERIE Stakeholder Trials:

## The use of leaf treatment on the infection rate of neck rot in Onions in The Netherlands

#### The problem

Over the years 2010-2013 the onion growers were facing serious problems concerning the quality of their product due to “neck rot” caused by *Botrytis* spp. It is a growing concern for the whole supply chain as approximately 85% of the Dutch produce (900,000 tons on average) is exported. Symptoms of neck rot show up sometimes during the storage period or during transport to export locations. Control of *Botrytis* spp. is not so easy, it is unclear when and how infection takes place. It is known that variety, nitrogen (N) rate and harvesting method play a role. Measures to prevent infection of the onion bulb is the innovation issue being examined here.

#### The proposed solution

From the research literature provided by the VALERIE scientists, we discovered that in some other countries the onion leaves are not chopped before harvesting. In The Netherlands, growers do chop the leaves, creating an infection route for the neck rot fungus. We tested different strategies of leaf treatment: no leaf chopping, “normal”, “short” and “long” leaf chopping. The onions are stored and checked for neck rot infection after an incubation period of 2 months. N-rate and varieties also have an influence on neck rot. We did a survey on 15 farm fields, with different varieties and N-rates, and assessed the neck rot infection rate 2 months after harvest.

#### Stakeholders

The stakeholders are growers, advisers, traders and seed companies and a representative of the branch organisation for the onion value chain. The topic was identified in the first stakeholder meeting of the project. Neck rot is of importance for the whole value chain. The infection becomes visible during the storage period (a problem for the grower) or during transport to export locations (a problem for the traders). There are also differences between varieties, which is why seed companies are interested in finding a solution to the problem as well. A high N-rate increases yield in tonnes per ha, but has a negative influence on product quality, it also increases the risk of neck rot. So far, high quality (neck rot free) onions do not sell at a premium in the market.



## Aims and Method

**A trial and survey were conducted.** The nature of the neck rot trial is scientific with different varieties, treatments and replicates. The objective is assess the influence of leaf treatment (see Fig 1) before harvest on the infection rate of neck rot in two different onion varieties; Type 1, a variety with a thick neck; Type 2, a variety with a thin neck. This was conducted at the Onion Innovation Centre Rusthoeve, Colijnsplaat.

In **the survey**, which was less formal, we selected 15 fields in different parts of The Netherlands, collected data from these fields (variety, N-rate, biomass development) and assessed the infection rate with neck rot 2 months after harvest.

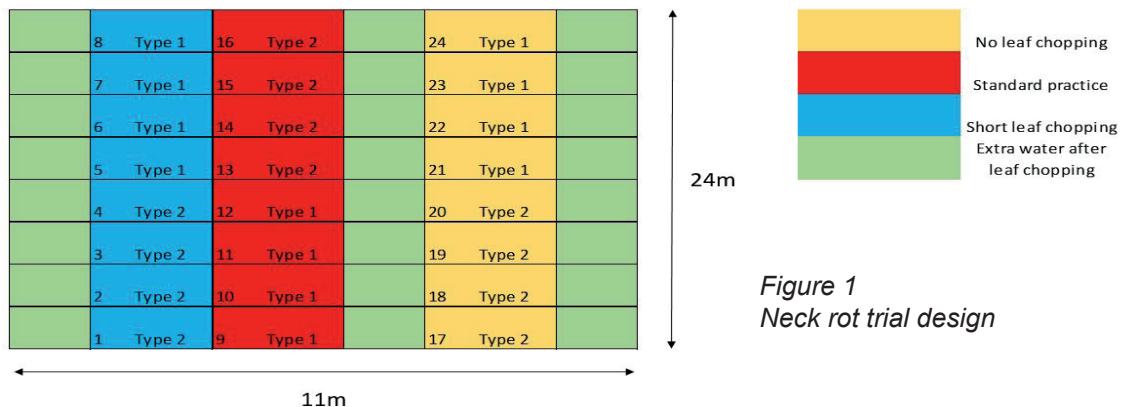


Figure 1  
Neck rot trial design

## Results

The trial in 2015 was destroyed by a hail storm in early September 2015, 2 weeks before harvest. As such, we could not collect any data. In 2016, the trial was harvested but there was no infection of neck rot observed, most probably due to the extremely warm and dry September month (Table 1). Also in general, the 2016 growing season showed very few problems with neck rot in practice.

Field Trial Sample	Onion Variety	Number of onions with:			
		Neck Rot	Bacteria	Fusarium	Soft Rot
1	Type 1		1		
2	Type 1				
3	Type 1				1
4	Type 1				
5	Type 2				1
6	Type 2				4
7	Type 2				5
8	Type 2				1

Table 1:  
Results of field trial (2016)

Two years of trials did not provide any useful results, for this reason we decided to repeat the trial in 2017.

Unlike September 2016, September 2017 was very wet in large parts of the country, also on the location of the trial, the Onion Innovation Centre.

The expectation was that due to the very wet September 2017, neck rot would be observed. The results show a significant number of onions with disease or other quality symptoms (170 out of 634), but from these 170 only 4 were caused by neck rot.





Field	Number of Onions	Number of onions with:			
		Neck Rot	Bacteria	Fusarium	Soft Rot
1	77	3	31	22	
2	64		3	5	
3	40		14		1
4	55		11	2	2
5	43		6		2
6	38	1	7		3
7	47		2	10	1
8	56		2	5	2
9	56		2	6	1
10	47		6	3	
11	67		2		1
12	44		10	4	

Table 2:  
Results of  
field trial  
(2017)

### Survey - assessment of farm fields in 2017

In addition to the field trial we conducted an assessment of 3 farm fields from 4 different regions, 12 in total. The expectation was that due to the very wet September 2017 neck rot would show up. The samples from these farm fields were assessed in the same manner as the field trial samples. The results below, show a significant number of onions with disease or other quality symptoms, much more than in 2015-2016. In 2017, 97 out of 667 (15.5%) showed quality problems but from these 97, only 1 was caused by neck rot.

Field	Number of Onions	Number of onions with:			
		Neck Rot	Bacteria	Fusarium	Soft Rot
1	56			4	1
2	54				3
3	57				10
4	65	1		23	2
5	57		1		8
6	62			2	
7	55				12
8	53			4	
9	64		3	9	
10	45		3	5	
11	52				4
12	47				2

Table 3:  
Assessments  
of farm fields  
(2017)



## Overall stakeholder involvement and feedback

Stakeholders have been involved through the stakeholder meetings and through the national onion innovation event that takes place every August. The VALERIE trial was part of the guided tour over the fields.

With limited results, the stakeholders have been unable to judge if the tested innovation is a solution. From the international research literature, it is known that not chopping leaves before harvest has a positive effect and results in lower neck rot infections, however we do not know how big this influence is under Dutch climate conditions. The results would have to be convincing in order to get stakeholder support for this measure as it would involve a significant “change of practice” throughout the supply chain.

Neck rot problems vary over the years, after a couple of years with few infections, the stakeholders lose interest in the problem. Although stakeholders realise that neck rot is still a serious threat for onion quality, not chopping the leaves in the field makes it necessary to do so at a later stage. This solution would require investment, and so far it is not clear if this is a profitable option.



## Key findings

- Neck rot was a big problem in 2010-2014
- 2015, 2016 and 2017 showed few problems with neck rot
- Literature shows that N-rate, variety and harvesting method play a role in risk of neck rot
- There was no difference between the treatments in the 2016 and 2017 trial, as neck rot did not show up, or was minimal, in the trials
- The risk factors for neck rot infections in the field are not very well understood, neck rot infections are hard to predict with the current knowledge, more research is necessary



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