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## High Resistance to TOBRFV

LOG/GROTEK fagdag agurk og tomat

18 August 2022

HIGH RESISTANCE ToBRFV

**HREZ**

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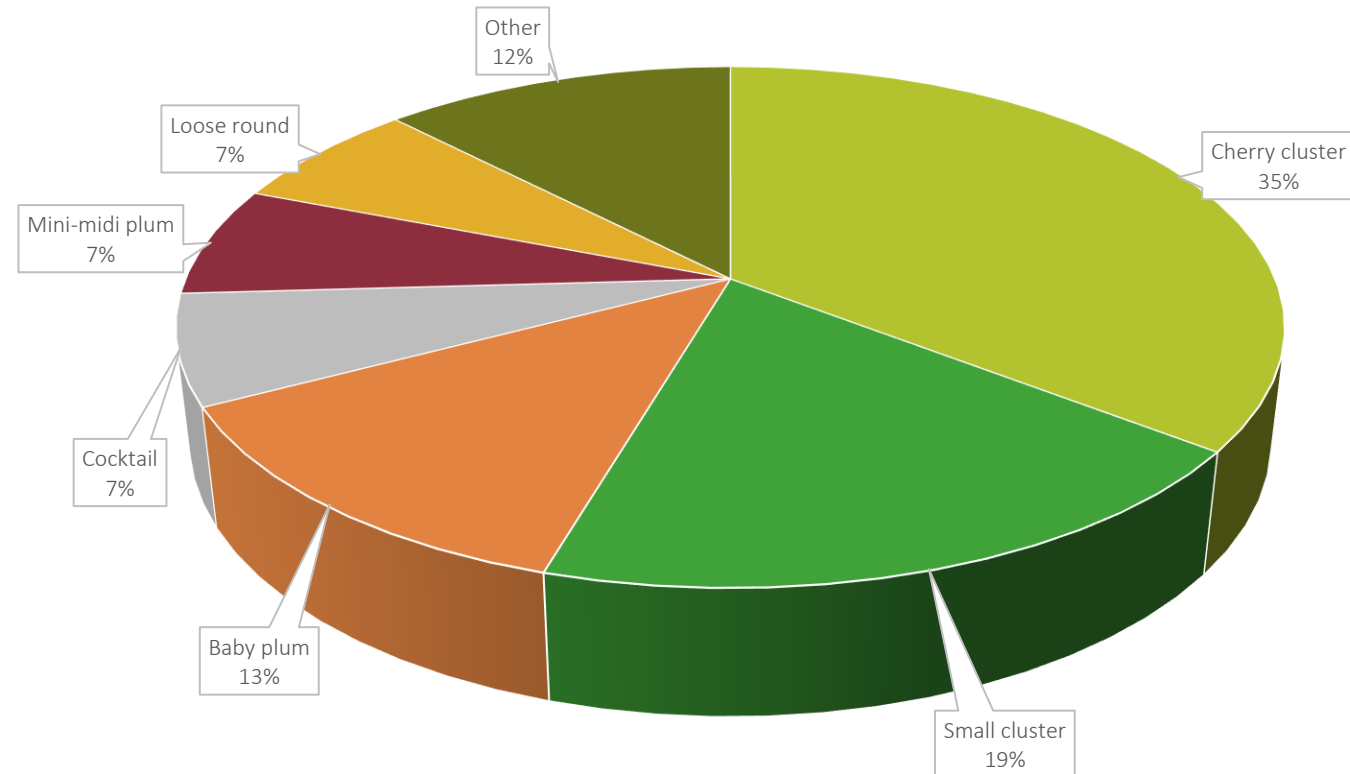
# The UK market

## The tomato market in the UK



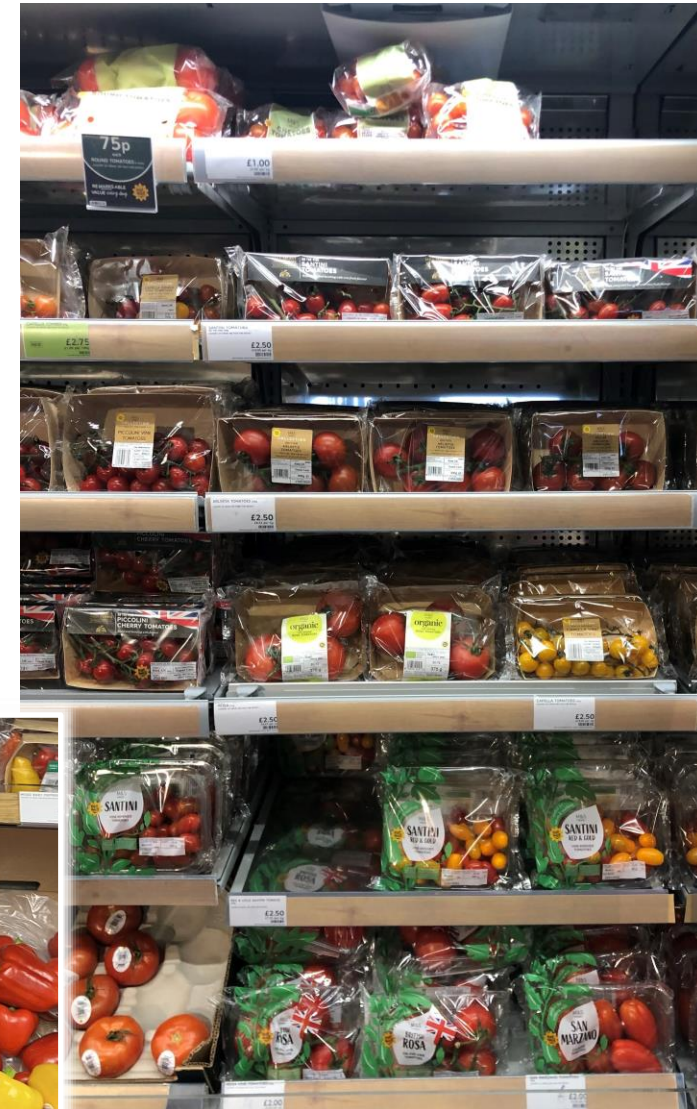
- The British people eat just over 400 thousand tonnes of tomatoes per year
  - We produce only 68 thousand tonnes in the UK (<20%)
    - Imports are from the Netherlands, Spain, Morocco, Italy, Poland, Belgium
  - Total area is around 220ha
  - Around 30ha has lights for winter production
  - The area is small, relatively stable, and gradually modernising
  - The majority of what is grown is premium/high-end product (local for local)
  - Organic/Bio production is around 10ha

UK tomato production by segment



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# Tomatoes in the UK supermarkets



## ToBRFV in the UK

- There have been only a handful of infections in the UK:
  - the first was in 2019
    - The grower has 3 blocks of tomatoes
    - Infection was seen early after replanting in one block
    - Once identified as ToBRFV the crop was removed
    - The infection was not spread to the other two blocks
    - Their hygiene protocol on site was already robust
  - the most recent was in 2021 (a re-infection)
    - This grower had a very mild strain which spread very slowly through the crop
    - It took a long time for the virus to be correctly diagnosed
    - The crop was mature by the time it was removed
    - The replanted crop was unintentionally re-infected even after an intensive clean-up
    - They have now cleaned up again and replanted at the end of July 2022
- Currently there are no known ToBRFV infections in the UK



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ToBRFV update

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## The latest news from Enza Zaden on ToBRFV

To view the update video from July 2022 use the url below:

<https://youtu.be/M200LX9Q-kk>

Our high quality gene bank led to the quick discovery of a resistance gene.





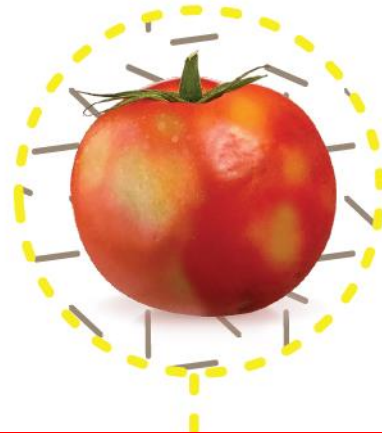
## IR or HR: what is the difference?

Enza Zaden identified the gene that ensures high resistance to ToBRFV in their new tomato varieties. But what is the difference between Intermediate (IR) and High (HR) resistance?



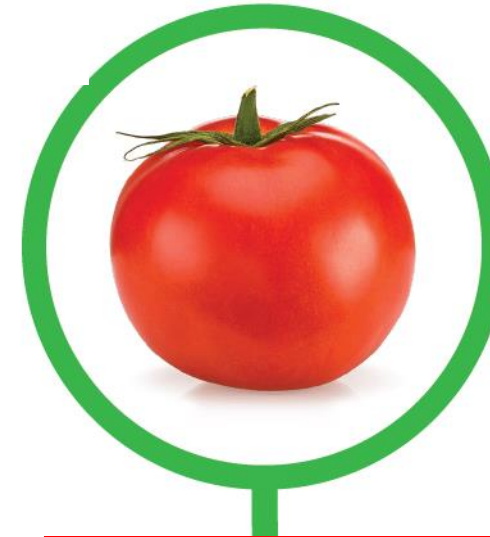
No resistance

- Virus multiplies to a high level in the plant
- Yellow spots and wrinkled patches on plant & fruits
- Presence of virus particles in the plant or fruits
- Yield can be affected



Intermediate Resistance  
(IR)

- Virus propagation is delayed
- Presence of virus particles in the plant or fruits
- The crop can show symptoms of the virus in the leaf and/or fruits
- Yield can be affected



High Resistance  
(HR)

- Highly restricts the accumulation of the virus
- No spread of the virus in the crop
- Yield is unaffected under normal disease pressure

## **Trials and observations**



- With High Resistance (HR):
  - Plants will maintain virus infections at undetectable or extremely low levels that will not lead to symptom development under normal disease pressure
  - This means it will not be a source for spreading the virus
  - In an HR variety, the plant will actively block the virus. There may be symptoms in the area where the virus first enters the plant, however the virus will not be able to multiply after it is transferred to the plant
  - You could potentially find some living virus on the HR plants, but in a very low dose

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## **Trials and observations - Rootstock**

- Resistant variety not grafted
  - Zero symptoms observed
  - High Resistance actively protects whole plant
- Resistant scion + non-resistant rootstock
  - A non-resistant rootstock is an entry point for the virus and therefore poses a risk
  - Under high disease pressure and high stress conditions the crop/fruit may show symptoms
- Resistant scion + resistant rootstock
  - Zero symptoms observed



The safest option for growers is to use:

- ungrafted high resistant varieties, or
- High resistant variety + high resistant rootstock



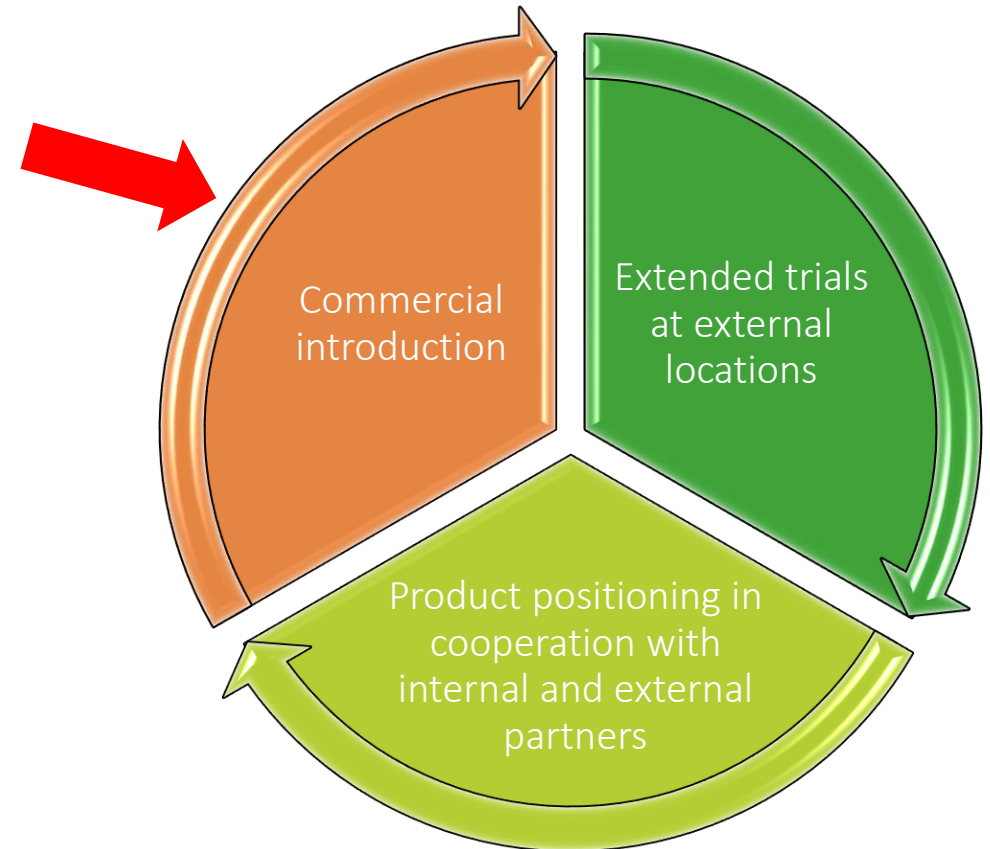
# ToBRFV HR varieties

## The route to commercial resistant varieties



A commercial solution is just around the corner

- We have developed, produced and tested products with ToBRFV high resistance (HR) in an *accelerated program*
  - Positive trial results through 2021 and early 2022 are followed by the first market introductions in mid-2022
  - Thanks to strong internal teamwork the time needed to bring new genetics to the market has been cut in half!
  - However this does mean that the information we have on the new varieties and rootstock is very limited. We will continue to work closely with growers to develop further



## **Commercial varieties with ToBRFV High Resistance**



- There are commercial varieties available now in some segments!
- For more information on the varieties available please contact your local Enza representative



# ToBRFV – practical advice

## ToBRFV practical tips

- Hygiene protocol – keep it out!
  - Limit number of visitors
  - Protective clothing
  - Provide and launder clothing for workers
  - Supply engineers with tools, ladders, meters etc
  - Reusable plastic crates – clean them! (Steam/wash at >90oC)
  - Do not pack imported fruit near tomato crops
  - No tomatoes to be brought on site for lunch
  - Be very careful if travelling to countries with high infection rates
- UV leak detection powder – make a trial!



Protective  
clothing  
must be worn  
in this area





## ToBRFV practical tips

- Preventing spread of viruses on site
  - Use and change gloves often (washing hands does not remove virus)
  - Clean tools often (knives, scissors etc)
- Cleaning up after infection
  - Clean up as early as possible in the crop cycle
  - Follow a clean-up protocol (eg CGMMV)
  - Use professional cleaners with the right machinery
  - Don't forget to clean electrical panels
  - Offices, pens, folders, computers, coffee machines – clean it all!
  - Concrete is especially hard to clean – maybe cover it with plastic?



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More information

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## Together, in the fight against ToBRFV



Stay connected with us, and register at:

[www.enzazaden.com/keep-me-informed-ToBRFV](http://www.enzazaden.com/keep-me-informed-ToBRFV)

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Data information and illustrations in this presentation shall correspond as closely as possible to tests and practical experience. This information shall be provided to assist professional growers and users, whereby variable local conditions must be taken into account. Under no circumstances shall Enza Zaden accept liability based on such information for deviating results in the cultivated product.

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