

HGCA Research and Development, Annual Project Report, 2010 results

Project number:	RD-2008-3498
Project title:	Strategies to reduce the impact of <i>Turnip yellows virus</i> on oilseed rape production in the UK
Lead partner:	Mark Stevens / Bill Clark
Scientific partners:	
Industry partners:	Keith Norman (Velcourt)
Government sponsor:	
Start date and duration:	1/1/09- 40 months

Project aim:

To raise the awareness of, and develop integrated strategies for, the control of TuYV in oilseed rape in the UK and to raise the productivity of UK oilseed rape.

Key messages emerging from the project:

- The spring 2010 TuYV survey showed higher levels of TuYV infection than 2009 (up to 92% plants infected) although the hotspot areas were similar and included sites along the south coast and around the Wash.
- In a trial at Broom's Barn, with appropriate plots sequentially inoculated with TuYV (from September through to March 2010) there was a clear relationship between the timing of infection and subsequent yield loss. Greatest losses (15%) were observed in plots from the earliest infections.
- All 49 of the current oilseed rape varieties are susceptible to TuYV when inoculated with viruliferous aphids. However, there are significant differences between varieties which could be ranked in the spring according to their virus titre and symptom expression.
- In early summer the highest virus concentration in infected plants was found in roots. This is a new finding.
- Only 22 *M. persicae* were caught at the 15 monitoring sites during the autumn of 2010. Of these, five contained TuYV.
- Levels of virus in these crops when tested in December 2010 ranged from 0 to 12%. The impact of the winter and poor flying conditions during the autumn 2010 will have a significant impact on *M. persicae* populations in 2011.
- TuYV remains an important disease of UK oilseed rape and must be considered as a factor that limits the yield potential of the crop in this country.

Summary of results from reporting year:

In 2010, the TuYV survey was conducted during March and April and covered oilseed rape crops on 45 farms in England and Wales. Fifty samples were randomly taken from each field and tested for the presence of virus by ELISA using TuYV specific antibodies. Virus 'hotspots' (up to 92% plants affected) were identified along the south coast and close to the Wash. These results re-enforced the findings that TuYV

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is widespread in the UK, and due to the favourable autumn in 2009 the virus was more widespread than the previous season.

In September 2009, 49 varieties from the RL list were sown in an observation trial (196 plots, 6m by 1.5m) to determine the impact of TuYV on symptom development and virus multiplication. Appropriate plots (two replicates) were inoculated with viruliferous aphids at the end of October. When plants were subsequently tested for virus during the following spring, the mean level of infection was 88% across the inoculated plots and 22% in the non-inoculated area, reflecting the autumn migration of virus-carrying aphids. Based on the ELISA data, it was possible to rank the varieties according to virus multiplication within plants; the least susceptible varieties were DK sequoia, Expert and WCOR07-1, with the most susceptible being NK Grace, Hornet and Gloria. Symptoms of TuYV were also assessed on a 1-9 scale and interestingly several varieties with lower virus titre expressed fewer symptoms. In the summer the virus concentration was highest in the roots, this is an area to be investigated further in the 2012/2011 season. Also, methods are being examined to quantify the build-up of anthocyanins, a consequence of virus infection, and to distinguish these symptoms from other biotic or abiotic stresses.

In a further trial, the impact of TuYV infection was measured over time. Oilseed rape plots were sequentially inoculated with virus-carrying aphids from mid-September until mid-March (except December due to snow cover). At harvest, the greatest yield penalty was observed from the earliest inoculation date (15%); yield losses in October and November were 13 and 3% respectively. This is the first time the impact of TuYV with time on the yield of oilseed rape has been measured, and the trial is being repeated in the 2010/11 season.

The Autumn migration of *M. persicae* was monitored at 15 sites between September and November using yellow water pans. However, only 22 aphids were caught in September and October; five individuals were found to contain TuYV. The level of TuYV infection in these crops was then measured in December and ranged from 0 – 12%. The impact of TuYV on the 2011 crop is therefore expected to be less than the previous two years.

Key issues to be addressed in the next year:

- To determine the extent of TuYV infection in the national crop in the spring of 2011.
- To determine whether there is a correlation between symptom expression and TuYV titre on subsequent yield loss targeting the 10 varieties ranked as most 'resistant' and 'susceptible' from the 2010 field observations.
- To determine the effects of TuYV on the physiology and growth of current varieties.
- To determine the impact of timing of TuYV infection (September-March) in a follow-up sequentially inoculated trial at Broom's Barn.
- To monitor the autumn migration of *M. persicae* in oilseed rape crops, determine the levels of TuYV within these populations and to provide this information to the oilseed rape industry so that appropriate control strategies can be applied.

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